



**Center for
Real Estate**

CONFRONTING THE HOUSING CHALLENGE IN LATIN AMERICA

PART I — Reflections on the Evolution of the Housing Market in Latin America: Realities and Dreams

Working Paper: comments welcome

Albert Saiz

saiz@mit.edu

*Daniel Rose Associate Professor of Urban Economics and Real Estate
MASSCHUSETTS INSTITUTE OF TECHNOLOGY*

With the Collaboration of Co-authors:

Alberto Cuéllar (MSRED Candidate at MIT)

Luis Rodríguez (MSRED Candidate at MIT)

Raquel Ganitsky (MSRED Candidate at MIT)

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Table of Contents

1. Introduction.....	2
2. Challenges for affordable housing in Latin America.....	4
3. Housing Need Assessments: México and Colombia.....	24
4. New Home Needs Assessment: Baseline Results.....	43
5. Baseline GDP Effort and Land requirements.....	47
Alternative Needs Scenarios.....	52
7. Conclusions.....	58

1. Introduction

The challenge of providing quality housing for everyone in Latin America has generated ample debate in the public, political, and policy arenas. Historically, the region has suffered from both qualitative and quantitative housing deficits. Part of the problem is explained by the twin legacies of macroeconomic volatility and lackluster Gross Domestic Product (GDP) growth of past decades. Relatively slow economic growth was combined with high income inequality, so that substantial proportions of the population struggled to afford formal housing of sufficient quality.

A lot of progress has been achieved more recently, however. Latin American economies and housing markets are much more vibrant today than they used to be only 20 years ago. Local firms have adopted real estate development and construction practices from other countries and have invested in their own technologies and in human capital to provide better housing solutions. In some Latin American countries, national policies and laws are nowadays more efficient and progressive *de jure* than those in many developed countries. Public registries have improved, and markets are more transparent due to the emergence of banking, governmental, and Proptech platforms, that disseminate information and provide buyers and sellers with tools to speed up and formalize transactions.

The qualitative expectations of an emerging and young middle class are now up to par to those of their peers in more developed countries. A large contingent of Latin American developers, builders, architects, and master planners are internationally renowned and appreciated worldwide. On the finance side – in countries that managed to tame inflation – mortgage financial markets and new investment vehicles in multi-family rental are slowly gaining traction.

And yet, high degrees of informality and lack of affordable access to high-quality homes still plague those in the lowest two quintiles of the income distribution. Even for the middle class, housing remains expensive, especially in the large metropolitan areas with better jobs, amenities, and opportunities for social promotion. This implies that the young are finding it difficult to fully emancipate. For those with lower incomes, housing informality might become the only viable option to live close to their place of employment.

There have been innumerable studies and policy papers devoted to housing in Latin America (McTarnaghan et al. 2016). Many studies adequately identify the main challenges and have provided very sound recommendations, most of them focusing on legal and financial reform. In turn, innovative housing policies have been aggressively pursued by enlightened governments in the region. In some nations, the technical capabilities of public servants in the housing and finance

ministries have improved exponentially. In the past two decades, a few countries have advanced dramatically in the design of affordable housing policies for the poor and in the reform of their legal systems, in order to accommodate best international practices. In fact, several Latin American countries – such as Chile, México, Ecuador, and Colombia – have become international references in this area.

While much necessary groundwork has been undertaken, there is not a single policy approach that will resolve once and for all the housing problems in Latin America. It could not be any other way. Housing deficits in the region have multiple causes, and will require of multipronged policy, market, financial, entrepreneurial, civil-society, and industrial approaches.

In this report, concretely in chapter 2, we focus on describing the critical factors underpinning housing demand and the current needs in the region, most of them stemming from its past economic and political history. We thus start by identifying critical problems in the housing sectors of Ibero-American nations. Most of the points that we make are not new. In fact, practitioners, developers, and the civil society are often keenly aware of these issues. However, new perspectives are always interesting to bear. It is not unusual for international organizations and national governments to take macro, legislative, or top-down approaches, thereby missing municipal dynamics. Conversely, local actors and entrepreneurs understand very well the situation in the field, but sometimes interpret that reality in light of their own interests. Here, we hope to provide a summary that is useful as a practical and unencumbered memo to the public, to policymakers, and entrepreneurs.

In chapter 3, we focus on the housing markets of Colombia and México. There is an extensive research literature documenting the quantitative and qualitative housing deficits in Latin America, and concretely in these two countries. There is also extant work estimating their home construction needs in the short to medium run. Existing studies go deep in the examination of one or two key parameters that will determine these nations' needs for housing development in the future.

Here we take the opposite direction: rather than precisely estimating a few parameters, we pursue an experimental approach and consider a more extensive set of those, allowing for uncertainty in their evolution via scenario planning. Hence, we investigate how housing requirements in the future should change depending on the uncertain evolution of the multiple variables that will impact housing markets. While our needs assessments are deliberately imprecise, the exercise makes it explicit how sensitive any forecasts are to several uncertain factors. Ours is a normative, not a positive exercise. We are not trying to forecast how many homes will be built over the next two decades, but how many *should* be.

In chapter 4 we discuss the results and benchmark the future demand for housing to its corresponding land requirement. Local governments will have to mobilize substantial quantities of urban land to fulfill the challenge of providing adequate housing to all. We also benchmark the total investment required in the construction sector to the growth of GDP in México and Colombia. While housing development programs and plans may be as ambitious as the imagination allows, they are ultimately constrained by economic realities.

While chapters 3 and 4 provide us with what we believe are reasonable baseline scenarios, in chapter 5 we modify several of the parameters, to understand what the most important driving forces for the evolution of the housing sector will be.

Chapter 6 concludes with a summary, and a brief introduction of our next report (part II of this project) on policy solutions to the housing supply challenges Latin America.

2. Challenges for affordable housing in Latin America

2.1. *Housing deficits*

The lack of housing affordability in a country—signified by very high urban home prices—directly stems from the inability of the national economy to provide enough housing of quality to every single household. Two concepts are often used to describe the lack of suitable housing in a country: those of quantitative and qualitative deficits. The definition and measurement of these concepts are not always straightforward. Qualitative deficit usually refers to the percentage of homes in the country or region that would require major improvements to be at minimum standards for habitability. For instance, houses that are not connected to the water or sewage system might be counted toward such deficit.

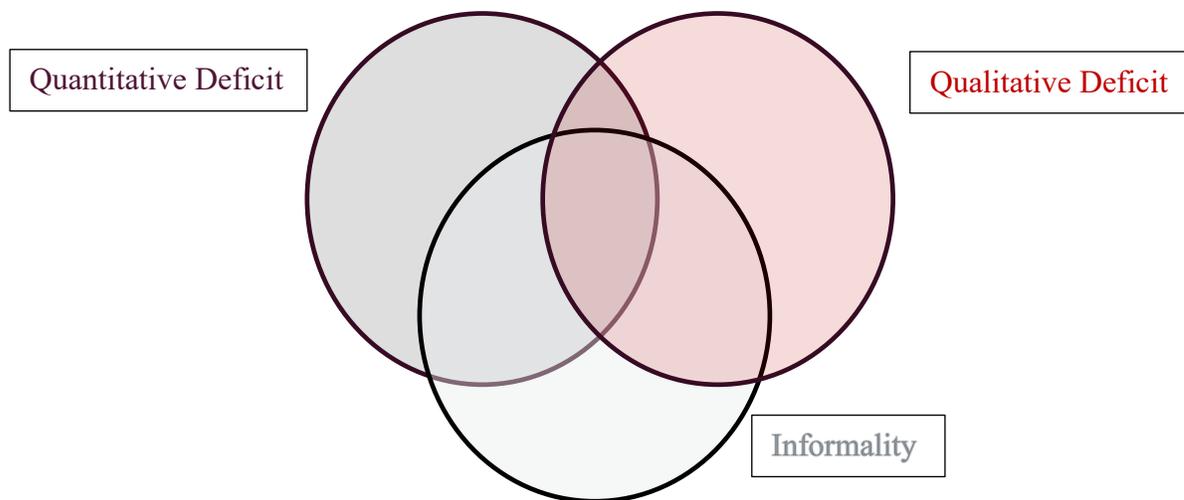
Sometimes, people also refer to the qualitative deficit as encompassing dwellings that are far from jobs, schools, services, or transportation networks. This inclusion is not uncontroversial, because “access” is difficult to define. Moreover, lack of access may be resolved through new job location, transportation policies, and investments in public facilities or infrastructure, and is not necessarily a housing problem—or at least not exclusively.

Quantitative deficit often refers to the need to completely replace fractions of the existing stock, due to its extremely low quality. For instance, a small, unstable structure made of corrugated iron may be deemed as in need of demolition and replacement. Multigenerational households who are living in crowded conditions can arguably be counted of as part of a quantitative deficit also.

Similarly, future quantitative deficits are expected if new housing construction falls below expected household formation needs.

A third related concept that revolves around the insufficiency of the current housing stock is that of informality. Informal housing refers to those structures that are built without an official permit, perhaps on a tract of land to which the dweller does not have official title. Illegal land occupation has unfortunately been a necessary resort for the poor to get access to urban shelter in most Latin American countries. The Brazilian term “favelas” describes well this phenomenon of irregular land occupation. While each individual favela was separately built by a family, the combination of informal homes configures a complex urban ecosystem (Salazar et al., 2021). Therefore, any housing solution or improvement to informal housing usually requires master-planning approaches at the neighborhood scale.

Figure 1. Overlap Between Different Definitions of Housing deficit



Of course, there is a substantial degree of overlap between the three different concepts of housing deficits, as shown graphically in figure 1. Informal homes may display qualitative deficiencies but still be inhabitable with additional improvements. Pragmatic policymakers have tried to improve their quality by providing upgrades to dwelling interiors or to surrounding infrastructures, even if the housing units themselves remain informal. In 1996, the Declaration of the United Nations Conference on Human Settlements argued for “*the upgrading of informal settlements and urban slums as an expedient measure and pragmatic solution to the urban shelter deficit*” (UN, 1996). For instance, the Favela-Bairro program in Rio de Janeiro focused on improving access to water, sewage, and street infrastructure albeit the efficacy of such programs is debated (de

Duren, Ruth, Osorio, 2020). It is usually cheaper to provide adequate infrastructure in ex novo developments than it is to retrofit and upgrade existing informal settlements (Fernandes, 2011).

Other policy approaches to informality have involved regularization, by providing official title to occupants. It has been hypothesized that bestowing home titles will spur capital investment (De Soto, 2000). However, detractors have questioned the theory and pointed to its practical limitations (Gilbert, 2002; Payne et al, 2009). In theory, the regularization of informal housing should have a positive impact on housing investments – therefore reducing the qualitative deficit – for two reasons:

1. By obtaining legal title to their homes, households can legally procure loans that are collateralized by the property, as well as increase their wealth via capital gains from the appreciation of the land;
2. Title regularization reduces the uncertainty of households about the continued future use of their property and facilitates future sales; this in turn increases the incentives to spend money on the asset.

There is now sufficiently strong empirical evidence demonstrating the positive effects of property entitlement on housing investments (Field, 2005; Galiani and Schargrodsky, 2010; Deininger, et al., 2011). Even if no formal title is bestowed, the regularization of informal settlements – via the official acknowledgement of the current occupants and provisions against removal – increases household expenditures on improvements (Nakamura, 2017). There is, however, no strong evidence for the collateral channel (Deininger et al, 2009). This may not be surprising, as overall financial penetration and credit availability in the developing world – and in Latin America in particular – are low, even for the middle-class (Buckley and Kalarickal, 2004).

Regularization can also be successfully implemented using Community Land Trusts, where the favela households share overall neighborhood land property rights, while individually owning the structures that they occupy and their future improvements (Davis et al, 2020) – similar to the functioning of homeowner’s associations (HOA) around the world (McCabe, 2011).

While title regularization can be beneficial if well-executed, it is not the panacea for solving the qualitative housing deficit in Latin America. Better approaches to improve housing quality for the poor explicitly combine formalization of housing titles and boundaries, together with localized subsidies for qualitative improvements and/or public investments in infrastructure – as in the case of Medellín (Betancur, 2007) or in several interventions in Perú (Fernández-Maldonado and Bredenoord, 2010).

A large number of research papers and policy reports provide alternative empirical definitions for the three housing deficit concepts in Figure 1, or critique extant definitions (e.g. Acevedo and

Araujo, 2007; DANE, 2009; Zaman et al. 2021). An added problem is that housing deficiencies may become politicized (McLeay, 1984), so that the definitions and measurements of quantitative, qualitative deficits, and informality offered by different national administrations across time and geographies are not always straightforward to compare.

In our research, we are agnostic about specific definitions of current *levels* of needs for new housing construction to replace the existing stock. Rather, we take as given the existence of a quantitative housing deficit that will require new construction of formal housing of adequate quality. In our prescriptive model, we provide different assumptions about the extent of the deficit. Therefore, we ask how realistic it would be to bridge *any* outstanding quantitative gap in Colombia and México under different scenarios of current and future needs.

Clearly, a housing quantitative deficit exists, and we would like to stop it growing and even shrink it in the future. Nonetheless, it is important that we understand its causes. Trivially, one is tempted to attribute the problems of housing affordability to low incomes. While this is a most important factor globally (e.g. Helble et al. 2021) and the one we start our discussion below with there are other common issues that impact the housing markets of most Latin American countries. We itemize these factors in turn.

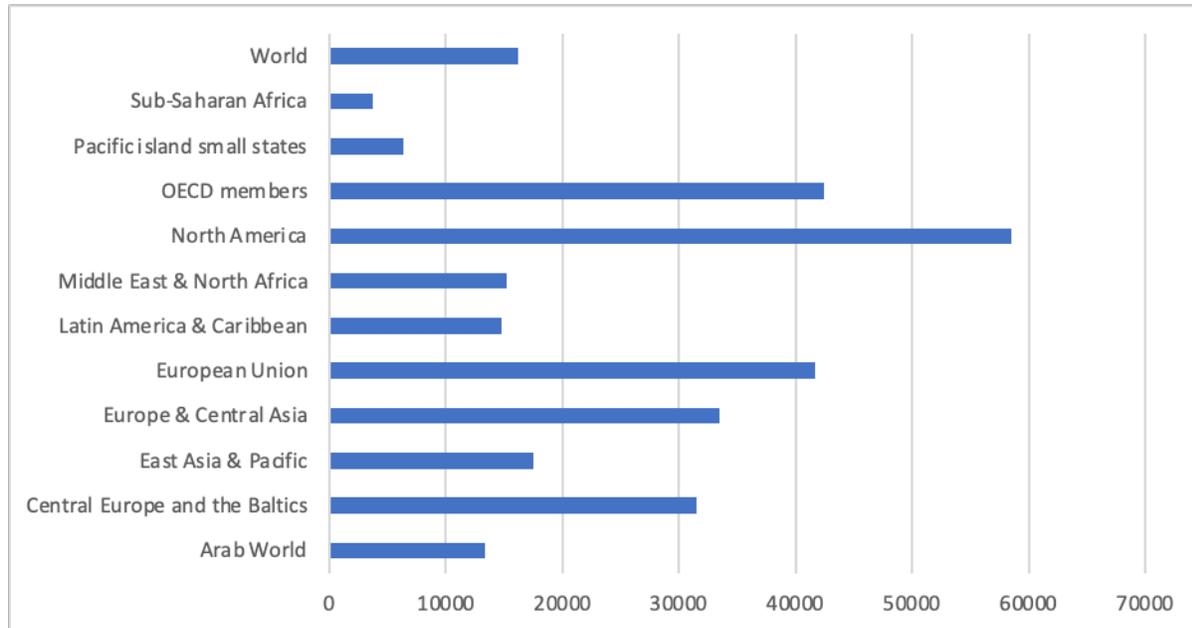
2.2. *Developing country incomes and relative GDP per capita stagnation*

Figure 2 displays the average GDP per capita in Latin America and the Caribbean in 2020 as measured in purchase power parity (PPP) using constant 2017 international dollars. These measurements already include the early impact of covid during 2020. Naturally, the regional average masks great variation in wealth across nations, but it is a good starting point for a global benchmark.

As can be appreciated, this measure of real income is substantially below those in the more developed countries in Eurasia, North America, and Oceania toward which many of the region's observers rightfully would like to converge. However, the PPP comparisons which adjust for the different costs of living by country are more favorable to the region than the usual ones based on current dollars. The world's average PPP income in 2020 was \$16,185. Latin America's average income at consumption prices was not very far below, at \$14,824.

Nevertheless, Latin America and the Caribbean's LATAM henceforth incomes are still far from those in Europe, North America, or the OECD as a bloc. They are also below the average incomes of directly competitive regions, such as the Middle East and North Africa, the post-communist economies of Central Europe and the Baltics, and rapidly growing East Asia.

Figure 2. 2020 GDP per Capita in PPP terms (2017 US Dollars)



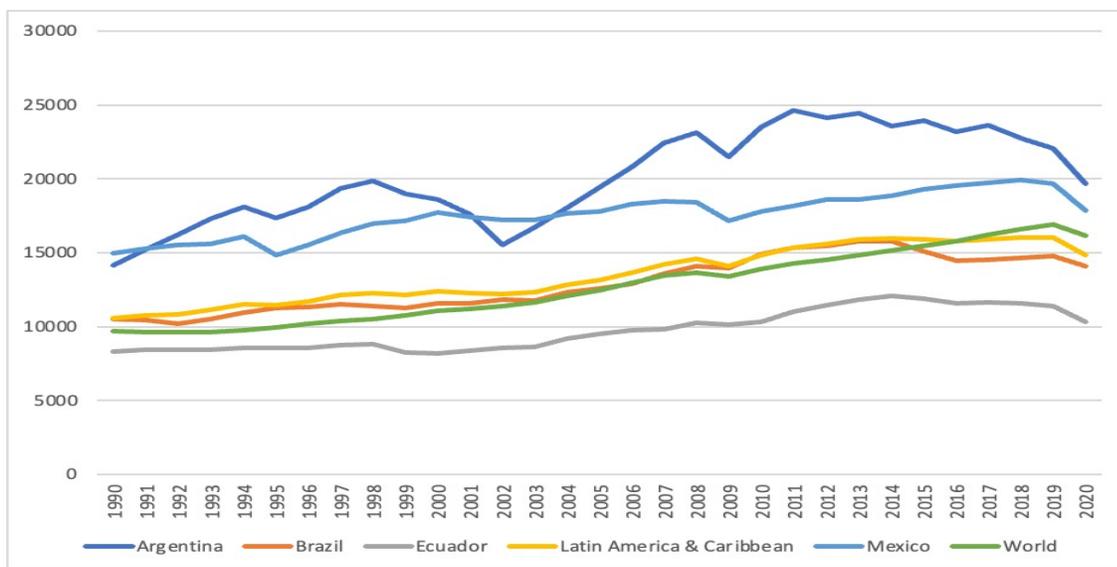
Source: International Comparison Program, World Bank | World Development Indicators database, World Bank | Eurostat-OECD PPP Program. Processed by the authors.

It could be pointed that national building construction costs diminish in countries with lower incomes, somewhat mitigating the GDP gaps. However, the elasticity of this relationship is substantially below one (Gyourko and Saiz, 2006). In other words, as one moves toward poorer countries, local construction costs decrease less-than-proportionally to income. For example, Tuner and Townsend (2021) estimates that the cost per square meter of what they denominate a “townhouse medium standard” dwelling is of US 1,723.4\$ in Toronto, compared to \$685.8 in México City at 2021 exchange rates. Canadian construction costs were thus 2.5 times more expensive. But income per capita was 4.3 larger in Canada relative to México (\$43,100 versus \$9,900 all calculations in current international dollars). Therefore, low-income countries tend to have expensive housing construction costs relative to their incomes: poorer countries are inevitably formal-housing poor.

A worrisome trend is in the relative stagnation of real income growth. Effectively factoring in the early effects of covid we can talk about a new “lost decade” for many countries in the region from 2010-2020. After the financial crisis of 2007-2009, growth has been lackluster or even negative in some nations. These trends can be observed in Figure 3 below. For instance, we can compare income growth in the region overall (yellow line) to the average growth in global GDP (green line).

Whereas global income growth has kept steady over the past three decades – with a dip due to covid-19 in 2020 – real GDP in LATAM at the end of 2020 was roughly equivalent to that of 2010. The reasons for this negative trend – which a few countries in the region have managed to buck – include: the drought of liquidity in global capital markets after the global financial crisis; the negative shift in the demand and prices of the staples exported by the countries in the region; the increasingly competitive global market for manufactured products; the inability of these economies to generate technological innovations fast enough in order to leapfrog other rising developing economies in the globally competitive environment; and, in some cases, political incompetence.

Figure 3. Evolution GDP per Capita in PPP terms (2017 US Dollars) – 1990-2020



Source: International Comparison Program, World Bank | World Development Indicators database, World Bank | Eurostat-OECD PPP Program. Processed by the authors.

It is too early to tell whether the covid-19 crisis will have a durable negative impact on Ibero-American economic growth in the next decade comparable to that of the past global crisis. The macroeconomic situation is nowadays further complicated by supply-chain woes, the Ukraine war, and the efforts of Central Banks to fight inflation. As we will see later, predictions here are uncertain and contingent on idiosyncrasies of each specific country.

2.3. *Substantial income inequality*

Unfortunately, the degree of poverty in LATAM's countries is more serious than what is suggested by their average incomes, because of their severe inequality. According to Busso and Messina's (2020), the ratio between the earnings of the top and the bottom ten income deciles of

the population in 2017 was at a staggering 22. Overall, the richest 1 percent enjoyed 21 percent of the region’s pre-tax income. The top decile enjoyed more than 50 percent of the GDP before taxes or direct subsidies. Given the relatively large sections of the population in poverty, it is only fair for housing policies to focus on providing decent homes to those in need of them.

The good news is that wage inequality in the region has been steadily declining between 2003 and 2017 (Busso et al, 2020) with, alas, somewhat of a deceleration of this positive trend after 2012. Overall, however, we have seen the progressive upwardly movement of new segments of the population into the middle class. This is a trend that we hope will strengthen in the years to come.

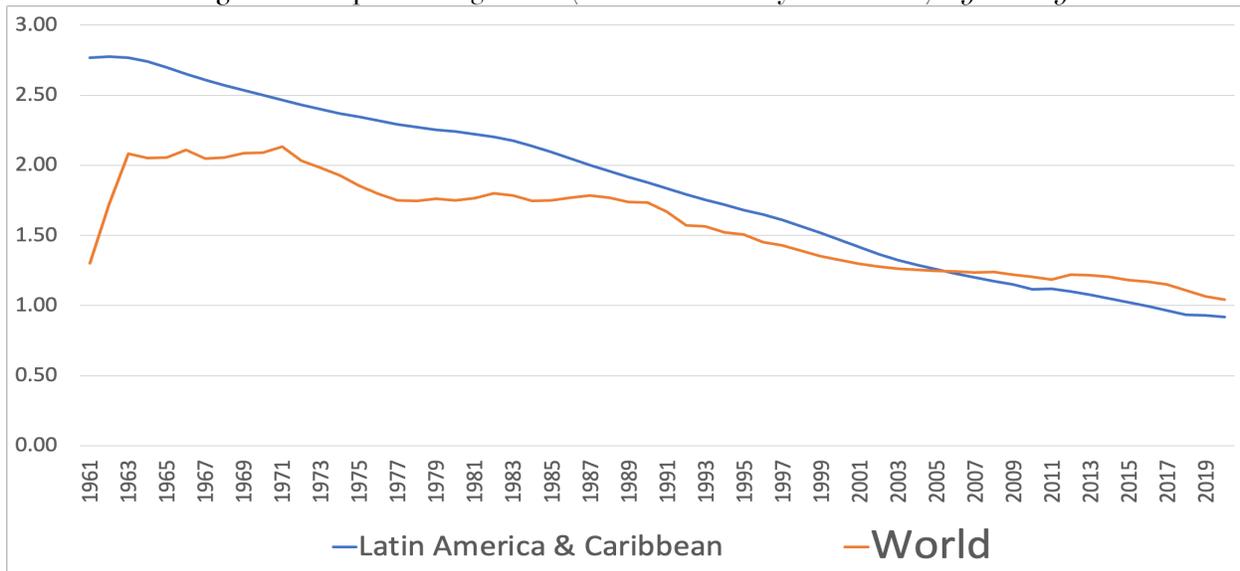
Together with the consolidation of redistributive housing policies an organically-buoying low-to-middle class market should be a critical source of growth for the real estate industry and the economy at large for years to come. Housing-related inputs and consumer goods such as bricks, cement, furniture, pipes, electric equipment, and kitchen appliances can be efficiently, competitively, and ecologically produced in Latin American countries without major technological breakthroughs. The housing construction, design, and renovation sectors are important employers and generators of national prosperity (Taltavull and Perez, 2012; Jaramillo, 2018). Home ownership contributes to building family wealth. And an efficient rental market facilitates the emancipation and mobility of the young.

Decreasing inequality and improving the housing situation at the bottom of the income ladder therefore not only deservedly increment the welfare of those who need it most, but additionally increase the economic “pie” at the national level. This implies that middle and upper-middle classes also benefit from major housing interventions targeting lower-middle class and poorer households. Zero-sum attitudes to redistributive housing policies sorely miss this point.

2.4. Rapid population and household growth

Population growth in most LATAM countries was consistently robust from the 1960s through the turn of the 21st Century. Because economic growth was not as consistent, the historically uneven race between income and population has bestowed us with a large stock of unmet housing needs. As can be seen in Figure 4, however, annual population growth in Ibero-America has been declining at a faster rate than the World’s more recently. In 2005, the global and regional average demographic paths crossed. From that year, the population of LATAM is growing more slowly than the World’s at large implying that Ibero-America and the Caribbean’s shares of the global population are shrinking.

Figure 4. Population growth (annual % from year earlier): 1961-2019



Source: International Comparison Program, World Bank | World Development Indicators database, World Bank |

Some countries are more advanced than others in this process of demographic transition. While most nations are not yet close to their demographic peak, some of them are expected to lose population over the next 80 years. A recent study (Vollset et al., 2020) predicts that Colombia, Costa Rica, Brazil, Nicaragua, El Salvador, and Chile will have *smaller* populations at the turn of the 22nd Century – this is, in 2100 – than currently.

However, the evolution of future housing demand is not solely determined by population growth. Changes in family composition can be as or more important. If the size of households decreases, as it is now happening in most LATAM economies, the demand for housing is bound to increase, without necessarily experiencing any population growth.

Households become smaller as extended families split into separate households, divorce rates increase, people have less children, live longer in their elder years in couples or by themselves, or delay marriage and childbearing when they are younger. These social changes tend to become more pronounced as average incomes grow (Helble et. al, 2021).

The example of Argentina – in Table 1 below – is indicative of this trend. From an average 4.28 occupants in 1960, the typical house moved to an average of 2.90 people in 2010. The fact that household formation has substantially outpaced population growth has been a critical factor fueling the new construction of homes in the United States, but it is becoming less relevant as family sizes stabilize at smaller levels there (Saiz and Salazar, 2017). We discuss this issue at length in our assessment of future needs below.

Table 1. Individuals per Housing Unit in Argentina: 1869-2010

Year	People	Homes	People/Home
1869	1,877,490	262,433	7.15
1895	4,044,911	536,034	7.55
1947	15,803,827	3,487,182	4.53
1960	20,013,793	4,681,333	4.28
1970	23,364,431	6,429,482	3.63
1980	27,949,480	8,196,120	3.41
1991	32,615,528	10,062,731	3.24
2001	36,260,130	12,041,584	3.01
2010	40,117,096	13,812,125	2.90

Source: Census of the Republic of Argentina

2.5. *Fast early urbanization at low development densities*

Latin America has a long and fascinating history of early urbanization. Ancient cities developed independently in the region, perhaps as early as the 25th century BC (Caral and Áspero, Perú) and around 1,500 BC (Tlapacoya, México). Some urban areas in the region Tiahuanaco, Cusco, Teotihuacan, Tenochtitlan, Tikal, and Cholula, for instance where amongst the largest in the world at their peak times in the eras between the Eurasian bronze and medieval ages.

In modern times, Ibero-American cities have experienced periods of very rapid urbanization as early as the 1920s, and then after 1950 (Almandoz, 1914, Trejo Nieto, 2020). In many countries, central governments used protectionist tariffs, fiscal policies, and direct transfers as channels to redirect resources towards cities and their protected manufacturing sectors (Trejo Nieto, 2017). The second part of the 20th century saw extraordinary urbanization and an explosion in the number of large cities in Latin America, at a growth rate almost unparalleled in the rest of the globe (Zárate Martín, 1989)

Historically, the extraordinarily rich urban width and depth of the continent have proven to be fertile assets, facilitating the emergence of superior educational institutions, culture, literature, and ideas. However, the very rapid urbanization of some of the largest cities during the “crises” decades of the 1960s and 1970s bestowed a development pattern characterized by large urban unemployment, job informality, and stark income inequalities (Portes, 1989). By 2011, 53 % of the world’s population lived in cities. However, LATAM’s urbanization rate was already at 79 percent a match to the

highest income countries, and much higher than in comparable lower- and middle-income regions (Jaitman, 2015).

This past phenomenon of *extraordinarily fast urbanization without extraordinary economic growth* leaves us with two current problems. The first one is a legacy of qualitative deficits in urban housing, as discussed early. The other one is more subtle. Because early urbanites tended to be relatively less affluent, they were more likely to build simpler structures at low construction heights. Construction of one or two-floor homes or commercial buildings was not unusual in city areas that are nowadays very centrally located, and with adequate access to jobs, amenities, and urban infrastructure. Metropolitan areas in LATAM have thus grown in a disproportionately horizontal fashion, relative to the metropolises in other developing countries that peaked later – such as China or Vietnam.

The resolution of current housing affordability issues in major metropolises will *sine-qua-non* require of the re-densification of some of the areas that were formerly developed at lower densities. Urban sprawl is already notorious in the largest cities, inducing not only housing but traffic and accessibility problems as well (Akbar and Duranton, 2017; Reyes, 2021).

2.6. *Metropolitan governance and coordination*

As in many other regions of the world, the lack of metropolitan governance and coordination in land-use planning severely impede efforts to provide affordable housing and compact urban development. While a degree of competition between jurisdictions is healthy and necessary (Tiebout, 1956), transportation, land use, and the provision of public goods need some degree of coordination across inter-connected jurisdictions (Gómez-Álvarez et al. 2017). This issue is of critical importance in the large LATAM metropolises – such as in the Valley of México – where urban growth extends beyond the main cities’ boundaries (Aguilar et al. 2003).

Approximately from the 1990s, a positive trend in many nations has been one of decentralization and power devolution to the large municipalities (Grin et al. 2017), from either the central government, or from the state governments in federalized nations such as México or Brazil. However – with the exemption of Quito – the municipal governments of large cities do not have instruments to compel coordination from smaller adjacent municipalities (Trejo Nieto, 2021). Extant efforts to sustain cross-municipal executive institutions typically fail due to lack of political support (Orellana et al. 2016). Municipal fragmentation in the large metropolises negatively impacts public service delivery and equality of access. It also has a detrimental impact on the coordination and development of transportation networks (Diekey et al. 2018).

More salient in our view is the lack of cooperation from some of the municipalities in metropolitan areas to substantially increase the supply of well-located land available for development, especially when the housing prices in the primary city are already very high. A clear symptom of this disease is in the large differences between the prices of serviced land in major cities and rural land in adjacent municipalities: Rojas (2015) finds the price of the former to be between 14 and 32 times the value of the latter. Given this blatant market-based signal of scarcity: why would not more land in outlying metro towns be released for development?

Another symptom of the problem is in the patterns of leapfrogging urban development. Because shovel-ready land is not available in well-located suburban communities, developers may resort to build in plots of land in locales that are far away from jobs and transit (Reyes, 2021).

The suburban “Not In My Backyard” (NIMBY) phenomenon is certainly not exclusive to Ibero-America (e.g. Gyourko et al. 2008), but the affordable housing needs in the region are much larger. Therefore, stronger political and civic pressure is required to push suburban local governments to reclassify and release much more urbanized, serviced land in well-located areas – and much faster.

The case of Bogotá is illustrative. Guzman et al. (2017) call this urban region “*the Metropolitan Area that never was,*” pointing to the many problems arising from its lack of inter-municipal coordination. These authors single out as problematic the absence of comprehensive land-use and urban development strategies.

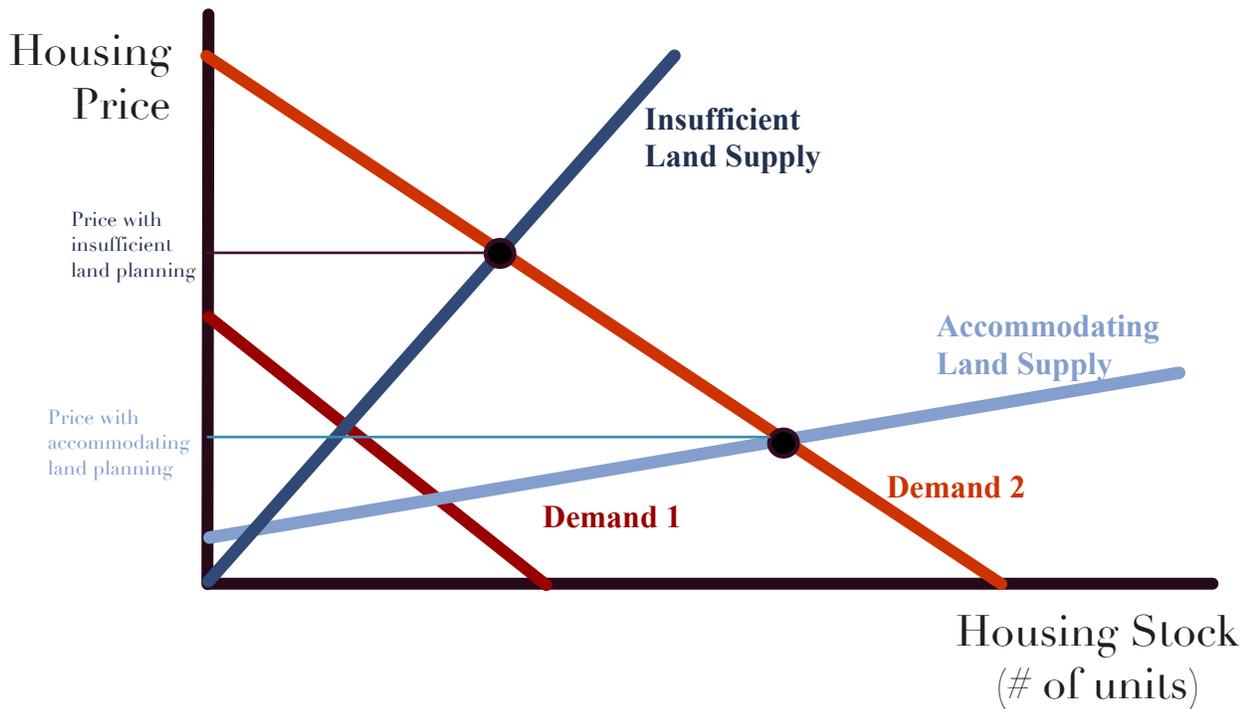
2.7. *Long-term municipal land use policies*

Urban land is very expensive in prime Latin American cities. As in the US and in other countries, the inability of city governments to up-zone empty or undeveloped land in large quantities and fast-enough to meet demand is one of the main determinants of housing unaffordability (Saiz, 2010).

Even though a new ideologically driven supply skepticism has emerged (Been et al. 2019), the evidence is overwhelming that policies that constrain or retard the release of metropolitan land for real estate development have detrimental impacts on city growth and housing affordability (Ball, 2011; Caldera and Johansson, 2013; Molloy, 2020). In the Latin American context, stringent land use regulations that make it difficult to build homes legally are furthermore associated with the construction of more informal housing (Monkkonen, 2013; Monkkonen and Ronconi, 2013).

These points can be appreciated in the supply-and-demand graph below (Figure 5). The figure shows the reaction of a housing market to increasing demand in a city where new land is released or redeveloped quickly, versus another where urban planning and policymaking are not nimble.

Figure 5. Housing Demand with Accommodating versus Insufficient Urban Land Release



The vertical axis of figure 5 represents the price of a standard housing unit in the city. The horizontal axis measures the number of housing units there. Housing demand in the urban area is growing (from “demand 1” to “demand 2”). The more appealing cities in LATAM’s urban systems are attracting population and thereby generating growing demand for housing. As it is happening worldwide, urban areas with a highly educated worker base (Glaeser and Saiz, 2004) – more oriented toward information technologies, health, research, innovation, and advanced services – and/or with extraordinary urban amenities (Carlino and Saiz, 2019) are disproportionately experiencing such demographic pressures.

The blue upward-sloping lines correspond to two scenarios of local land supply as per alternative urban planning policies. The light blue line corresponds to a housing supply function with accommodating policies. Here the municipality had already planned to make fully entitled land available for the next 10-20 years, and the approval process for new projects is swift. New housing demand can be accommodated with only a modest increase in housing prices.

The dark blue line corresponds to the converse situation: the municipality does not have enough land that is officially entitled or ready to be developed at high densities “as of right.” Rezoning – sometimes via a “spot zoning” process (Mandelker, 2018) – is uncertain and difficult. Here, increasing housing demand mostly translates into higher housing prices, rendering the city

less affordable. This problem is compounded wherever approval processes are slow – even if the structures proposed by developers in the little land that is available are mostly compliant with the rules. In this case, the supply of housing is inelastic and – in addition – delays in the permitting process exacerbate boom-bust cyclical dynamics (Saiz, 2019).

Practitioners and policymakers have nowadays become more aware of the importance of supply-side constraints, and of the need for re-densification of their central cities. New regulations and policy reports dwell on these issues (e.g. CVSR, 2014). While intentions are good, we will need more aggressive action by municipal governments to deal with the problems.

2.8. Municipal land rezoning and approval practices

It is not only the strategic issues around land-use planning that plague urban areas. But also, the tactical problems generated by the complexity of the procedures needed to get construction started – contingent on the proper zoning and the conformity of the development to it. Turner and Townsend (2021) surveyed professionals in the building industry around the world, and asked LATAM respondents for the main problems in the construction sector of their countries. This source reports that “50% of respondents said that government red tape, bureaucracy, delayed approvals had a significant or high impact on the delivery of construction projects.”

The World Bank “Doing Business” program surveyed architects, construction contractors, lawyers, and municipalities around the world to ask about the administrative processes involved in obtaining building permits. They focused on the construction of a warehouse and assumed that the appropriate zoning for the lot had been already in place. Their indicator measures the number of bureaucratic procedures, their cost, and the time it takes for the full administrative process to clear, assuming the project follows extant rules. While many aspects of the “Doing Business” (DB) indexes have recently come under scrutiny, these types of governance indicators do provide a first-order approximation to some of the outstanding issues (Kauffmann and Kraay, 2008; Besley, 2015).

The data in table 2 averages the ranking of each of the 190 countries studied by DB, aggregated by region. As we can see, countries in Latin America and the Caribbean rank relatively low: as a group, only above sub-Saharan Africa. Interestingly, some of the countries that truly enforce health codes, consumer safety, and better working-condition rules – thereby obtaining better outcomes along these dimensions – fare better in this index. For instance, Denmark, Singapore, and New Zealand are among the top performers. Therefore, there is no apparent tradeoff between the speed and efficiency of the building approval process and other pro-social policy objectives.

Table 2. Cost, Complexity, and Time to Construction Permit across Regions

	World Bank Doing Business 2020: Dealing with Construction Permits Average Rank by Region
East Asia & Pacific	84
Europe & Central Asia	85
Latin America & Caribbean	117
Middle East & North Africa	87
OECD high income	52
South Asia	98
Sub-Saharan Africa	126

Most policymakers and civil servants in local land planning and building municipal approvals in LATAM display strong devotion to public service and perform their jobs with transparency and fairness. However, corruption can be a pervasive problem, even if is initiated by only a few bad apples. In some Latin American cities, municipal-level corruption related to the rezoning of land or project approval has been and still is a major problem (e.g. Jiménez and García, 2014; Salas, 2016; Morales, 2019).

Corruption is always hard to document, as victims or perpetrators do not typically disclose its existence and extent. However, its effects are easy to grasp. Consider, for instance, a hypothetical municipality where corruption payments amounted to between 1 and 3% of real estate sales prices. Their impact on affordability is much larger than that, because construction costs and land values may represent 80-90 percent or more of sales prices, and marketing costs can be substantial. Given their risky position as claimants of the residual value, developers need to increase their markups or not go ahead with development as corruption payments would amount hypothetically to more than 10-30% of ex ante net profits. Additional problems can be induced by the existence of local procurement lobbies, cartels, and organized crime.

2.9. Political instability and lack of consensus in housing/investment policies

As in most parts of the globe nowadays, it is difficult to understate the degree of political polarization in LATAM (Morales, 2015). In many countries, changes to the political color of the central government can be associated with drastic fluctuations in housing and mortgage credit policies. The same can be said regarding mayoral transitions in the largest cities. Land use policies

and procedures may be abruptly subject to disruption upon the arrival of a new government of a different political color. While the national land planning legal framework, major laws regulating housing construction, and housing policies are slow to change *de jure*, differences in their effective quantitative and qualitative implementation have more of an impact *de facto*. Budget allocations are an obvious tool used by legislative bodies to enable or curtail specific policies that figure theoretically “in the books.”

Another set of problems may arise when the mayor of a large city is not of the same political color than the regional or national government (Eaton, 2017). Ideological conflicts can be severely detrimental to the execution of land and housing development policy. National governments need the cooperation of local authorities to implement such plans. For instance, demand-based housing programs may fail if local governments do not provide the necessary local infrastructure transportation, sewage, water, electricity, street paving. Additionally, demand-side policies can be handicapped if municipalities do not release enough land on the supply side.

Land planning should optimally involve a long-run process, requiring a degree of local and national consensus. Today we are planning the homes that will be built over the next ten or twenty years. Investments in construction and housing by businesses and households are long-lived. Similarly, competitive mortgage markets and financial stability take long times to build, as they rely on the trust established by millions of market participants. And yet, that trust can be quickly broken. These disquisitions suggest that broad political consensuses are necessary to advance the affordable housing agenda in the region.

2.10. Lack of access to—and high price of—mortgage finance

While progress has been extraordinary in the past two decades, most LATAM nations still have relatively thin long-term finance markets. Mortgage penetration is smaller compared to high-income countries and other middle-income regions, such as East Asia. However, there are large discrepancies between countries: the depth of the mortgage finance system ranged from 23% as a percentage of GDP in El Salvador and Panama, to barely one percent in Argentina and Jamaica (Beck, 2016).

The purchase of a dwelling requires of a large upfront investment compared to household income, thereby necessarily involving a purposeful financial strategy. To mobilize the funds for the acquisition of a house, families must either: i) save all the money upfront and buy in the future; ii) receive substantial transfers from family members; iii) purchase or self-build low-quality dwellings

and upgrade as it becomes feasible; iv) obtain a mortgage, gain possession of a home today, and periodically repay in time while slowly building up equity.

Strategy i) is associated with delayed family formation, low regional mobility, risky forms of wealth accumulation early in life (e.g. inflation may erode the value of savings), and unsatisfied, single youths living with their parents; or with overcrowding, as large extensive families have to live together in relatively old homes. Strategy ii) can only be attained by the wealthiest members of society and exacerbates wealth inequality. Strategy iii) is associated with informality and quality deficits. If credit is available and cheap, strategy iv) is the best option for young couples to emancipate, raise children, and build equity, all the while living in decent housing conditions.

It has become fashionable among a few academics and ideological critics from “intellectual” elites to voice dismay at the growing “financialization” of housing markets (Epstein, 2005; Rolnik, 2013; Fernandez and Aalbers, 2016). It is paradoxical that a few such critics take advantage of the benefits of financial market themselves by using mortgages to buy homes; leasing cars; depositing money in savings accounts; enjoying the use of credit and debit cards; and by accumulating stock-market wealth in university, company, or government-sponsored tax-exempt savings plans. In this context it is important to boldly state that *we need much more financialization in Latin American housing markets, with a focus on improving the living conditions of the middle working classes and those currently excluded or at the margins of their economies.*

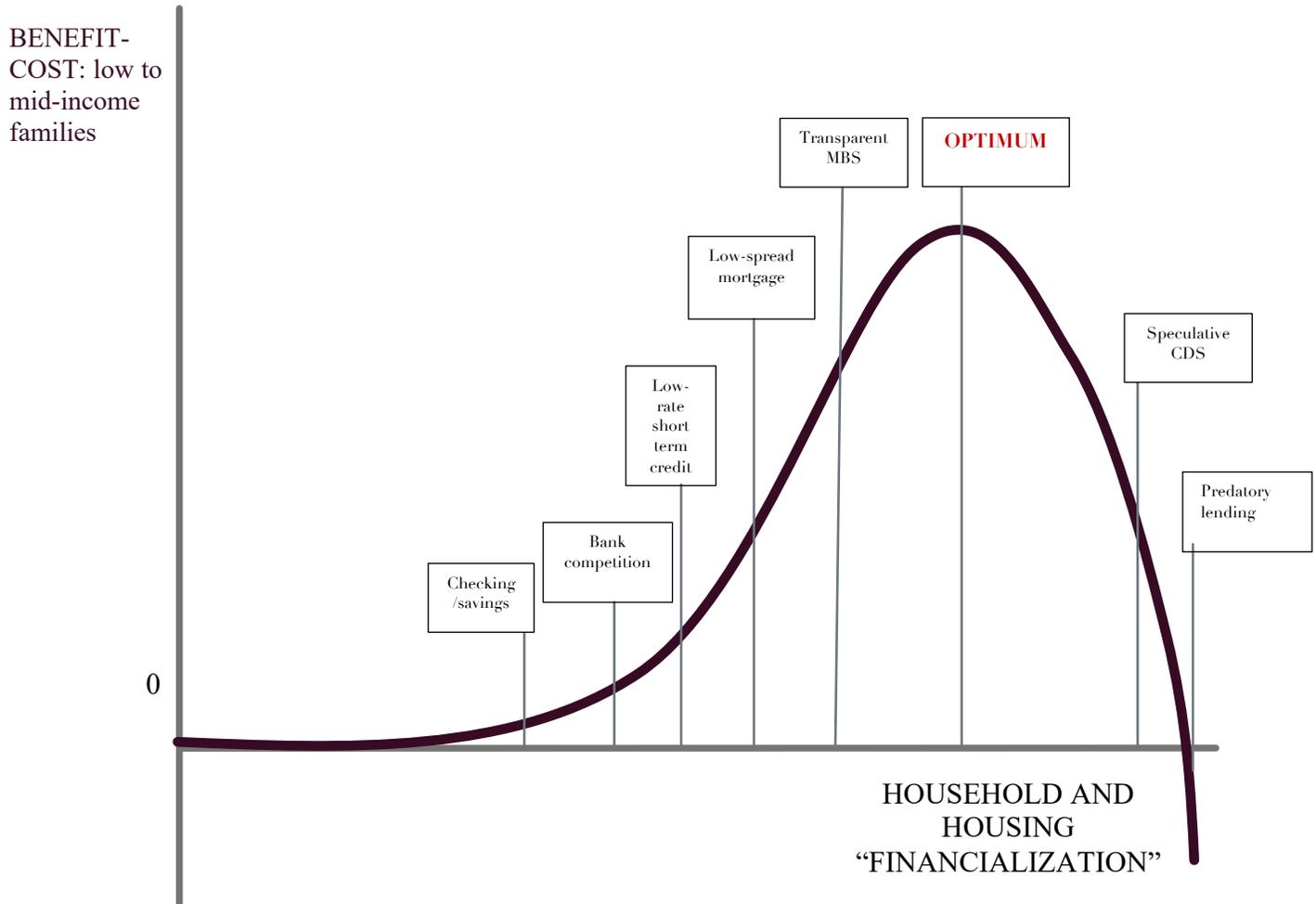
This need for furthering the penetration of financial markets (“financialization”) in the housing sector of the region can be appreciated conceptually in figure 6 below. The degree of financial penetration in a country is measured in the horizontal axis. On the vertical axis, we capture a measure of the benefits minus the costs of each financial innovation – as in cost-benefit analysis (Prest and Turvey, 1966). We focus on low- to mid-income households – but similar arguments could be made for the average citizen.

As one increasingly moves along the x-axis in figure 6, overall welfare increases: in other words, most households would express satisfaction with their new situation if we provided these financial improvements, while those who did not appreciate them would be free to pass on their use.

It is positive for households to gain access to checking and savings accounts, to transparently conduct transactions and safely receive payments (Barr, 2011). For poor households, checking accounts are important to receive periodical government assistance without the need for constant applications to different programs or a permanent address – as social-program take-up rates can be

very low. Therefore, access to financial institutions can be a positive tool for a prosperous, redistributive society.

Figure 6. Cost-Benefit Analysis of Household “Financialization”



Competition in the financial system is critical to avoid the gains of subsequent financialization to be captured by a few. Competition tends to reduce credit spreads (Van Leuvensteijn et, al 2013) e.g. the difference between the inter-bank lending rate and consumer credit interest. *Cheap* short-term credit allows families to buy cars, appliances, down-payments on a house, or safely buy items using a credit card. As long-term credit becomes more available, it is possible for the banking sector to provide mortgages at competitive rates, with spreads between one hundred and two hundred points above the interbank rate. The emergence of covered-mortgage debt or residential Mortgage-Backed Securities’ (MBS) markets can further help households. These markets tend to be associated

with a further compression of mortgage credit spreads, via cross-collateralizing of risk (Chiquier and Lea, 2009).

Most countries in LATAM display much too low levels of financialization, making life harder for low- and mid-income families. Of course, even if these financial tools have overall positive cost-benefit balances, it is important for practitioners and policymakers to structure and regulate them in ways such that the costs are minimized, and their benefits are at a maximum.

In addition, there are credit instruments that indeed imply an excessive degree of financialization. Large profits from financial products based on hyper-leveraged speculation, asymmetric information, and lack of competition are eminently suspect. For instance, predatory lending products (Engle and McCoy, 2001) – consisting of loans with extremely high interest rates to desperate liquidity-constrained poor households – should not be on the market. In the mortgage arena, a predatory strategy involves the use of teaser rates – deceptively low initial low mortgage rates that eventually revert to very high ones. Another practice of excessive financialization is the issuance of credit default swaps (CDS) by uncapitalized institutions. CDS are equivalent to insurance provided to a mortgage lender by a financial party: in exchange for an upfront fee, the financial insurer commits to covering any mortgage defaults. However, if the insurer is not well capitalized, CDS can be seen as mostly fraudulent contracts.

While excessively speculative finance can be a problem, Latin American families are still in need of more financialization to help them purchase decent housing. Mortgage rates have come down in the region over the last two decades, but they are still much higher than in OECD countries – oftentimes more than double. The cost of mortgage capital is one of the most important determinants of the ability of a household to “carry” a house at an affordable level. Why are household credit markets relatively thin in the region? We believe that there are at least four explanations for this fact. Each of these explanations provide actionable targets for policy and entrepreneurial innovation.

2.10.1. Job informality and financial access

Financial transactions that are commonplace for many – like withdrawing cash from an automated teller machine – can represent a hurdle for segments of the population in LATAM. In some nations, only 30 to 50 percent of the adult population have a bank account. This compares to more than 90 percent in countries like the US, UK, or Spain, or roughly 80 percent in China (McKinsey Consulting, 2019).

There are many reasons for this. One of them is the high rate of job informality (David et al.2020), which is a major determinant of access to basic banking services (Dabla-Norris et al, 2015, Berrío, 2016). People with unreported incomes are much less likely to open bank accounts. While job informality had been decreasing, the covid-19 pandemic may have set us back in this regard (Acevedo et al. 2021).

2.10.2. Credibility of Government debt and macro instability

In our view, the most important determinant of the relative low credit availability in the region is its recent history of macroeconomic instability. It is very difficult – if not impossible – to be a creditor if the value of assets depreciates constantly and unpredictably due to inflation. While creditors could theoretically index mortgage interest rates to current inflation – the consumer price index (CPI) – high inflation still generates a substantial “tilt effect” (Kearl, 1979). Mortgage tilt dramatically reduces the demand for mortgage products. In addition, CPI-indexed mortgages display substantial default risks, as consumers’ incomes may not always grow at the same rate as inflation. Finally, mortgage products that rely on CPI indexation cannot be widespread in countries experiencing generalized high inflation: the potential for CPI manipulation is just too large (Cavallo et al. 2016). When government payments are indexed to CPI the incentives are obvious. But when consumer payments to private firms are also tied to the CPI, the government has yet another added motivation to gain populist appeal by reducing them.

Empirically, the global evidence is conclusive that macroeconomic instability and inflation beget thin mortgage markets (Sanders,2005). According to Tinoc-Zermeno et al’s (2014) study of México’s financial market: *“inflation rates have contributed negatively to the increase in private credit, liquid liabilities, and financial development.”*

Relying on foreign capitals to finance local housing expenditures is risky. Most Latin American economies are much too dependent on their precarious trade and capital balances as it is (Malagón et al. 2021). Therefore, the existence of native conduits for long-term savings and investments –denominated in the local currency and geared toward local capital – are typically needed to kickstart sustainable expansions of the mortgage market. For instance, well established and liquid 10- to 30-year sovereign treasury markets are usually important to price and underwrite long-term interest and inflation risk.

Inflation and macro-economic instability are mortgage killers because they interrupt the establishment and deepening of long-term capital markets. This is an important lesson for the

governments in the region, as the temptations to print money or to run systematic budget deficits are omnipresent. Note that fiscal probity and monetary stability need not be associated with any specific ideological position. Denmark and the US are two countries widely recognized for their macroeconomic stability. But their social policies are very different. For instance, in 2018, the share of government expenditure over GDP was 50.55% in Denmark, but only 37.8% in the US.

2.10.3. Competition/depth of the financial sector

Competition in the banking sector may ensure that the benefits of financial penetration accrue mostly to families (Flores and Watts, 2012; López Mateo et al. 2018). The optimal role of mortgage lenders is as simple facilitators of conduits to cross-collateralize mortgage risk and service payments *at the minimum spread possible* (the difference between the interest paid by borrowers and received by long-term investors).

A concern is that the Ibero-American banking system has been historically concentrated sometimes dominated by nationalized institutions and less competitive than in most OECD countries (Chortareas et al. 2011). In fairness, the entry of new actors into the sector has been limited by the relative lack of financial depth, per the two explanations above.

Recent banking consolidation has further reduced the number of financial institutions in Latin American countries. The global financial crisis accelerated this trend worldwide (Rao-Nicholson and Salaber, 2016). The recent wave of bank consolidation may have been positive to a degree, due to the fragility of national financial systems after the crisis (e.g. Kim and Shin, 2013). However, we look forward to the growth of financial competition in the region in the years to come.

2.10.4. Security of Credit Investors and Collateral Enforcement

Bankers are seldom regarded as the most sympathetic constituency in the public political discourse of any country, and LATAM nations are no exception in this regard. Nonetheless, it is important for legal enforcement systems to allow creditors to recoup their investments. No rational financial institution will lend money at an economic loss. And irrational ones are not sustainable in the long run. Empirically, the ability of banks to enforce their collateral in cases of non-payment is a clear determinant of the depth of financial markets (Djankov et al. 2012, Assunção et al, 2014). Recovery rates directly impact potential losses from mortgage origination (Ghent and Kudlyak, 2011). Lack of lender security has been a problem in the region historically (Rojas, 2005). While national laws have improved in this respect, their local application by each judge and jurisdiction are still subject to fluctuations.

Of course, preventing evictions is an important societal goal, which we would like to achieve while keeping mortgage credit financially viable and cheap to ensure housing affordability. To do so, explicit subsidies for catastrophic situations, counter-cyclical negative amortization schemes, and cross-collateralization of default risk arising from underwriting credit to vulnerable customers should be pursued.

3. Housing Need Assessments: México and Colombia

3.1. *Future Housing Market Need Assessments: Eight Critical Parameters*

While the challenges are substantial and numerous, we need to envision positive paths that lead us to eradicate the *quantitative* housing deficit in Latin American nations. Our aim in this chapter is to provide relevant magnitudes to measure the scale of the affordable housing challenge in two important LATAM countries: México and Colombia. The basic ideas and methodology can be exported to any other country.

We focus on basic long-term macroeconomic dimensions and benchmark our definition of future quantitative needs to the evolution of GDP and to land use requirements. The overarching social aim – our stated dream – is to bring those at the risk of exclusion to the middle class by providing formal housing to all; we assume a gradual process of new housing development covering current and future needs over a period of 20 years: 2022-2042. Is this economically feasible?

Of course, even if the GDP and land-planning systems were up to the task of providing quality formal housing to everyone in Colombia and México, some of the barriers described in the previous sections still stand. Importantly, the sustained growth of the middle class and the existence of housing policies that target the needs of the poorest are critical for our affordable housing dream to be realized. Middle-class housing policies are also critical, but they can be pursued with large degrees of self-financing (Rojas, 2019).

In our calculations we eschew the need for qualitative improvements to the housing stock, urban infrastructures, and transportation networks. These are important topics but best left for another research project. Our focus is on new housing-unit requirements, in what eminently is an exercise in real estate development economics.

We believe that a simple ten parameters allow us to calibrate the future housing construction needs of a country, and to benchmark them to realistic scenarios. Forecasts and assumptions about these critical ten parameters will have a profound impact on the evolution of assessed housing needs. We itemize these ten parameters below:

- a) **Population growth rates in the relevant areas**
- b) **Number of individuals per home: household formation rates**
- c) **Current quantitative deficit percentage**
- d) **Normal physical depreciation and economic obsolescence rates**
- e) **Construction density – floor-to-area ratio (FAR)**
- f) **Land requirement ratio for other urban improvements in greenfields**
- g) **Share of greenfields versus brownfields in future development**
- h) **Average Construction cost**
- i) **Growth rate of real construction costs**
- j) **Growth rate of real GDP**

The ten parameters above capture population averages and, of course, do not fully represent the complexity of housing markets in our reference countries. For instance, construction costs are very heterogeneous. Each housing development possesses a slightly different set of amenities, structural characteristics, and quality of finishes. Nonetheless, statistical thinking allows us to make inferences even in the presence of large heterogeneity. The law of large numbers implies that empirical averages capture the population mean. By multiplying the population mean – e.g. average construction cost per unit – by the total number of items in the population – e.g. number of dwelling units – we obtain accurate estimates for the relevant sums – e.g. total spending on construction.

Our baseline assumptions about eight of the ten critical housing metrics for Colombia and México are explicated and justified below. They can also be found in accompanying EXCEL™ open-source spreadsheets. While we conduct a few sensitivity analyses, interested readers should feel free to alter our baseline assumptions and explore alternative scenarios, or to change the model altogether. We are agnostic about how much development will happen in greenfields as opposed to in grounds that are already urbanized, a topic that will – in our view – require of continued study from architects and urban planners in the region.

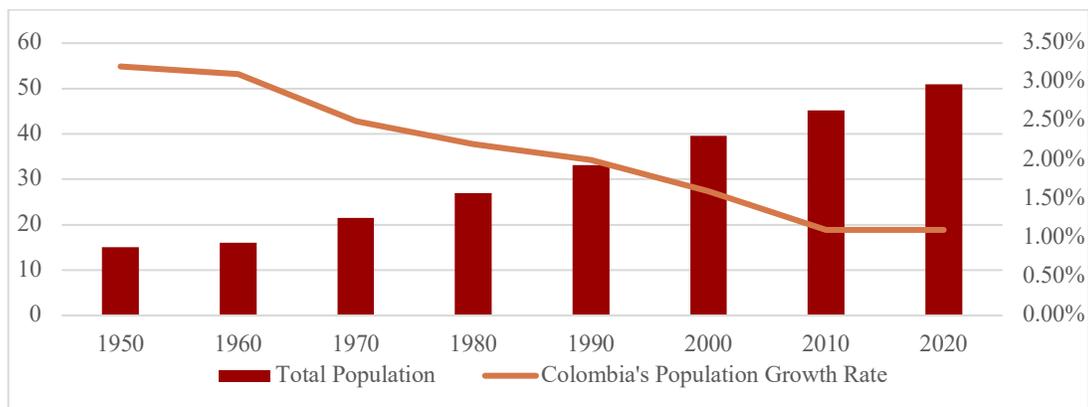
Our model assumes an exponential progression of variables at constant annual growth rates, and therefore abstracts from the fluctuations that will inevitably be associated with future business cycles. It is better to think of them as long run trends to which we should eventually catch up. For instance, if current supply-side bottlenecks and geopolitical tensions retard economic growth and construction in 2022 and 2023, more housing should be built between – for instance – 2024 and 2027 to compensate for the shortfall. Of course, this implies that the difficulties of implementing housing development plans are much larger for entrepreneurs and investors, as they must deal with the problems induced by economic fluctuations in both consumer demand and the cost of factors. This suggests the need for policymakers to flexibly allow for the progressive phasing of real estate development plans – while holding developers accountable for outcomes in the long run.

3.2. Population Projections

The starting parameter to determine housing market demand is the growth of the population. It is worth analyzing separately trends for México and Colombia, and subsequently analyze how they relate to each other and to other countries.

Per Figure 7, Colombia's population displayed steady growth from 16 million people in 1960 to 50 million currently. However, this linear trend in the levels has implied decreasing percentual growth rates. In addition, fertility rates have been declining more recently, further pushing down current population growth rates. This reduction in natural population growth due to lower birth rates is expected to continue in the future.

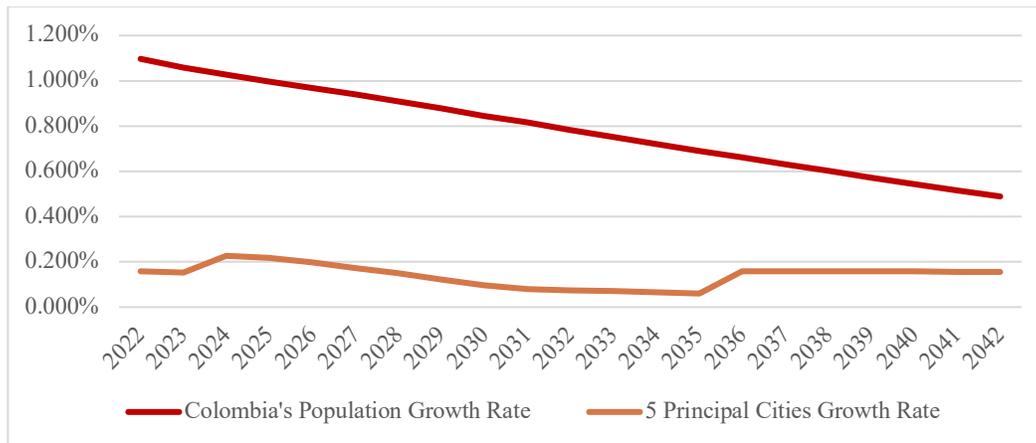
Figure 7. Colombia's total population through 2020



Source: DANE, 2018.

Our model assesses housing needs based off population projections from government agencies over the period 2020-2042. The Department of National Statistics (DANE) in Colombia provides population projections for each municipality (DANE, 2018). We focus on the 5 principal cities of the country: Barranquilla, Bogotá, Cali, Cartagena, and Medellín, which arguably represent the major economic, political, and social centers of the country. We complement these local forecast which are only available until 2035 with extrapolations from the national population projections 2018-2070 (DANE, 2018). This approach makes sense because urbanization rates are not expected to change dramatically over the period. Nevertheless, note that this interpolation method implies a somewhat spurious discontinuity in our urban needs assessments in 2035, the year to which we transition from the genuine city estimates to interpolations.

Figure 8. Colombia's population growth rate forecast



Source: DANE, 2018.

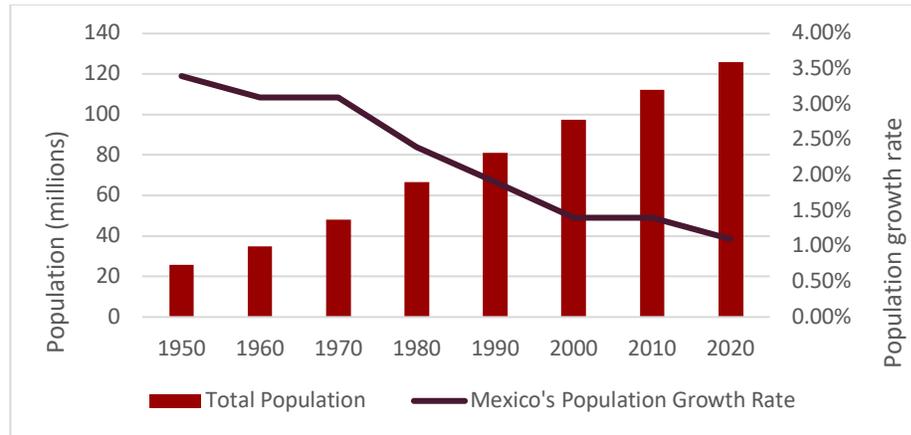
The national forecasts for the period 2022-42 show continued population growth at decreasing rates, following previous trends. However, the growth rate of the reference cities barely changes (Figure 8) because it was already very low. Nonetheless, the previous lackluster evolution of the metropolitan population could have been due to the difficulties in providing new housing in the large metro areas, especially in Bogotá. We acknowledge the possibility that incrementing supply in the large cities could endogenously beget faster population growth there, but do not explicitly model for this uncertain phenomenon. Allowing for such feedback loops would increase further the amount of housing required in the country's metropolises, at the detriment from needs for new dwellings built elsewhere in the nation.

The decline in demographic growth over the study period is of utter importance to the future evolution of Colombia's housing construction sector. Residential building depends critically on the flows of new households, rather than on the extant stock of homes.

Trends in México are not dissimilar – as can be appreciated in Figure 9. Population has almost doubled in size over the last 40 years, from 66.8 million in 1980 to 126.1 million in 2020. However, growth rates have also been decreasing, from 3.4% in 1970 to 1.2% in 2020.

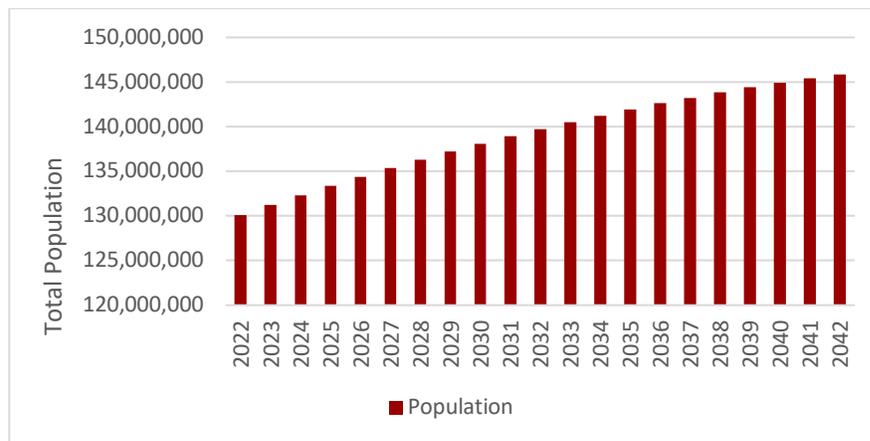
Our data from México are partially obtained from the decennial censuses and other publications by the Instituto Nacional de Estadística y Geografía (INEGI). A source for prospective data is the Consejo Nacional de Población (CONAPO), concretely its 2016-2050 population projection report (CONAPO, 2016). This forecast anticipates a substantial deceleration of population growth, as can be appreciated in Figure 10.

Figure 9. México’s total population and population growth rate



By 2042 the nation may inch closer to its demographic peak – expected in 2062. Fertility rates have precipitously declined, and the population will be getting older, so that the demographic dividend that México boasts about today has a set expiration date.

Figure 10. México’s total population forecast



Source: CONAPO 2016.

We will sometimes focus on eight selected main metropolitan areas, including some of the most populated in 2020: Valle de México, Monterrey, Guadalajara, Puebla-Tlaxcala, Toluca, Tijuana, León, and Querétaro. These key metropolitan areas – which exclude regions that are mostly geared toward providing tourism services and host a large fraction of second residences – account for almost 34% of México’s population – as seen in Table 3 – and for much of its economic manufacturing and advanced service bases. Metropolitan-level population growth forecasts are provided by CONAPO until 2030, and subsequently extrapolated using national forecasts.

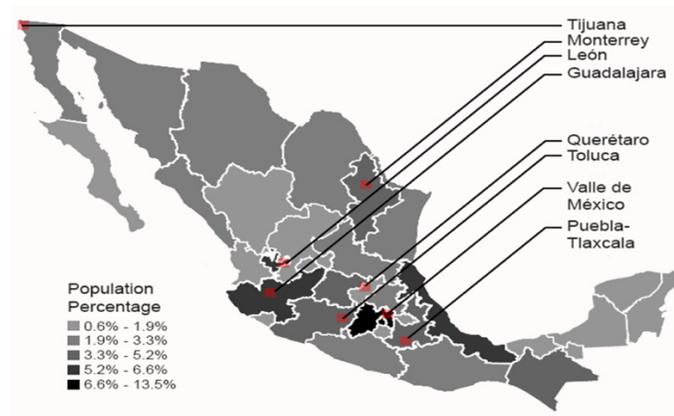
Table 3. Population in the eight key selected metropolitan areas in México

Zonas Metropolitanas	Población	%
Valle de México	21,942,666	17.2%
Monterrey	5,133,917	4.0%
Guadalajara	5,243,178	4.1%
Puebla-Tlaxcala	3,179,162	2.5%
Toluca	2,377,828	1.9%
Tijuana	2,011,247	1.6%
León	1,880,630	1.5%
Querétaro	1,478,201	1.2%
ZM de México	43,246,829	33.9%

Source: INEGI (2020)

Under the baseline modelling assumptions, our eight metropolitan areas represented 33.9% of the population in 2020 and will slowly decrease their share of the Mexican population to 33.16% by 2042. Yet, we think that these major metropolitan areas will be critically important in terms of leading future urbanistic policies and real estate development paradigms, and therefore require separate analyses. Figure 11 illustrates the states in México a federal country pinpointing the location of our key metropolitan areas.

Figure 11. Geographic location of México’s key metropolitan areas in the study



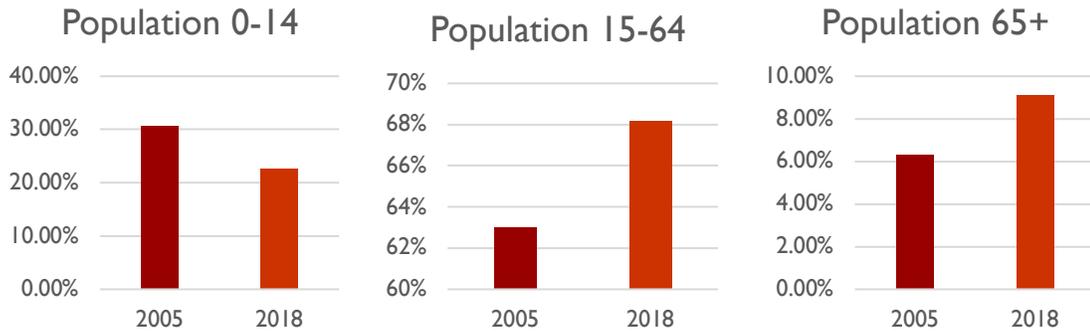
3.3. Regional Trends: Demographics, Family formation, Urbanization

Both Colombian and Mexican demographics are following global trends regarding population aging, international migration, and changes in household composition. National migration to urban centers is still happening, albeit much more slowly than in the past.

Comparing the Colombian 2005 and 2018 Censuses, one can appreciate (Figure 12) that the population is rapidly getting older. The group from 0 to 14 years sharply decreased from 30.7% to

22.6% of the population. The share of 15 to 64-year-olds increased from 63.0% to 68.2%, and the proportion people over 65 edged up from 6.3% to 9.1% (DANE, 2018).

Figure 12. Colombia’s population recent age distribution

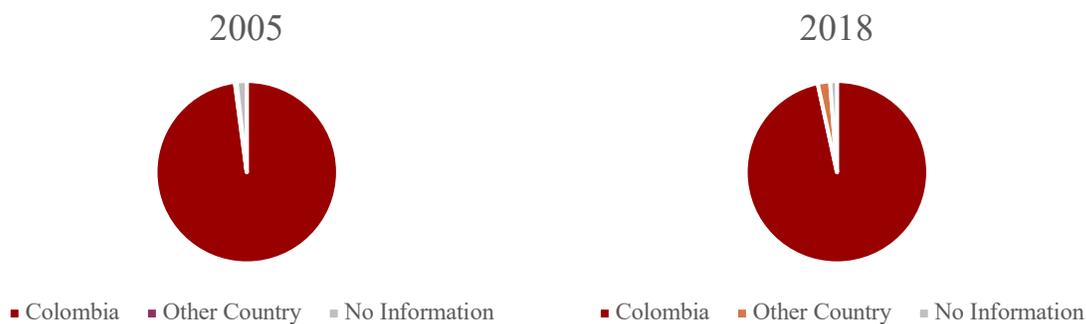


Source: Dane (2018)

The urban population increased from a fraction of 76.0% in 2015 to 77.1% in 2018 (DANE, 2018). Nevertheless, urbanization rates are already very high, and their sustained growth cannot be expected to drive housing demand for much longer in the years to come. In contrast, competition *between* metropolitan areas to attract firms and employees will likely become more relevant.

Immigration from Venezuela has been an important factor recently. In 2005, 97.9% of the population was born in Colombia as displayed in Figure 13. By 2018, a lower fraction 96.6% of the population was born locally (DANE, 2018).

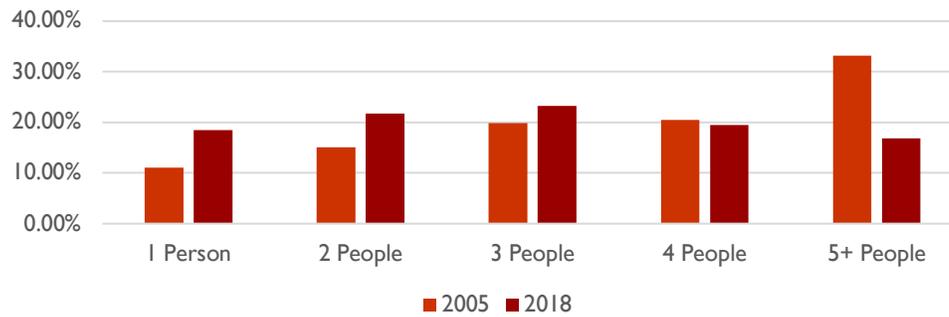
Figure 13. Colombia’s population distribution by country born



Nonetheless, the most shocking and significant change regarding housing demand is the reduction in household size (Figure 14). From 2005 to 2018, one-person units went from encompassing only 11% of the homes in Colombia to 18.5%. Two-person units increased from 15.1%

to 21.7%. Three-person units increased from 19.8% to 23.2%. Four-person households decreased from 20.5% to 19.5% and five-person-or-more homes went from 33.2% to 16.8% (DANE, 2018). This distribution resulted in an average of 3 persons per unit by 2018.

Figure 14. Colombia’s household size distribution



Saiz and Salazar (2017) studied the change in the household composition of the United States. They noted that while the average household size had gone from 3.29 in 1960 to 2.58 in 2020 overall, that figure had only changed by 0.01 person/house in the very last decade. This suggests that residential density may have reached its zenith or stabilized in the US. Household density has stabilized in other countries like Norway, at 2.2. We believe that Colombia like the United States will probably not reach that number. It is not unreasonable to expect that Colombia’s household density will stabilize at a number closer to 2.6 people/house.

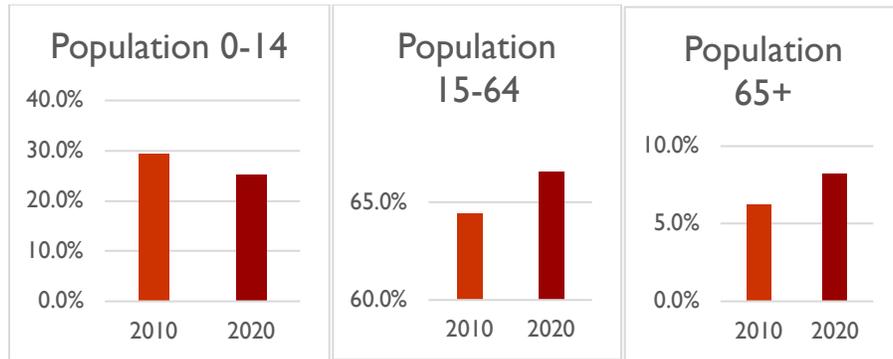
Hence, we build our model at a baseline estimate of a steady linear reduction in family density to 2.6 people per household by the end of 2042. The required total housing stock calculated each year arising from demographic changes thus becomes:

$$\text{Required Housing Stock (Natural Demand)}_{\text{Year } i} = \frac{\text{Yearly population}_{\text{Year } i}}{\text{People per household}_{\text{Year } i}} \quad (\text{EQ.1})$$

México’s demographics are also changing, as shown in Figure 15. Comparing the 2010 and 2020 censuses, the share of children (ages 0 to 14) decreased from 29.3% to 25.3% of the population. The share of 15 to 64-year-old people grew from 64.4% to 66.5%, and the fraction of people over 65 went from 6.3% to 8.2% (INEGI, 2020). The median age increased from 26 to 29 and the birth rate decreased from 2.6 to 2.1, a trend that will continue in the years to come.

Figure 16 displays recent population growth rates, with substantial differences across regions. But note again that these could have been partially driven by relative housing market tightness.

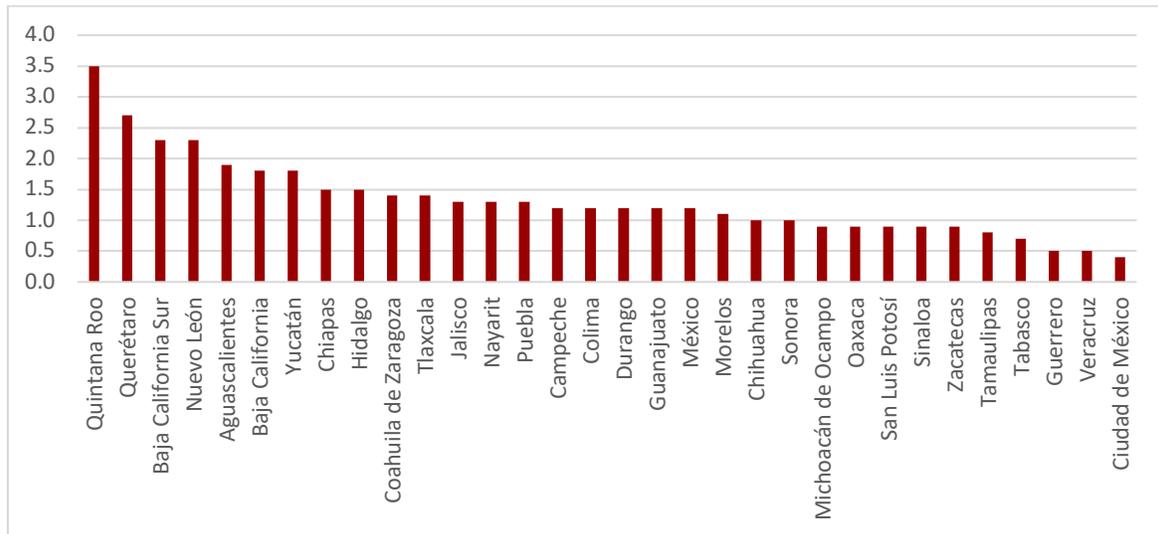
Figure 15. México's population age distribution



Source: INEGI, 2020

Intra-national migration has benefited some of the coastal conurbations endowed with cultural amenities, good weather, and growth of in tourism employment, such as Riviera Maya or Baja California Sur. However, manufacturing industries in México are still growing. For example, more than 5 worldwide-carmakers have established manufacturing facilities in the central Bajío area: Querétaro, León, Guanajuato, San Luis Potosí. As can be appreciated in Figure 16, Quintana Roo, Querétaro, and Baja California Sur have seen overall annuitized population growth of 3.5, 2.7 and 2.3 percent per year by 2020.

Figure 16. México's average annual population growth rate by state

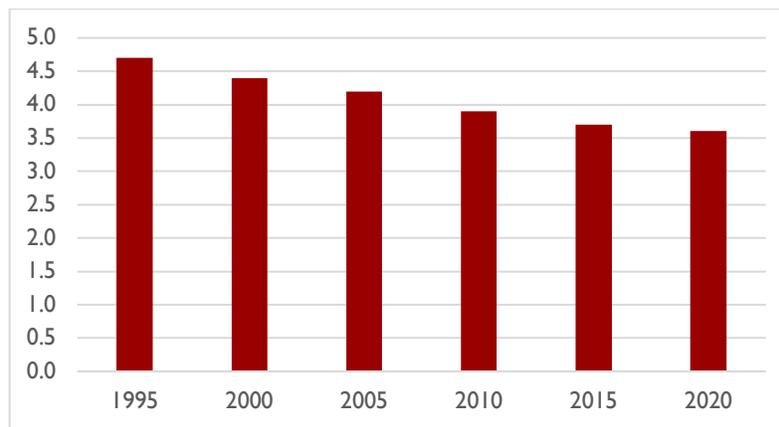


Source: INEGI, 2020

International migration has not been a major issue so far. In 2010, 0.9% of the population was born abroad, compared to 1.0% in 2020. Policy shifts in the USA and emigration from Central American countries could change the current outlook, but uncertainty on this regard is substantial.

From 1995 to 2020 the average household decreased from 4.7 to 3.64 persons per unit. (INEGI, 2020), with household formation outpacing population growth in all quinquennia (figure 17). In the calculations of (EQ.1) in our housing needs assessment model for México, we start from the ratio in 2020 and assume a linear reduction of household sizes down to 3.0 people per household by the end of 2042.

Figure 17. México’s average household occupational density evolution: 1995-2020



Source: INEGI, 2020

3.4. Existing Housing Stock

In 2018, the Colombian DANE counted over 16 million housing units (DANE, 2018) of which 40% were in our five reference cities (Table 4)

Table 4. Housing units in reference cities of Colombia

Existing Housing Units (2018)	Barranquilla	559,049
	Bogotá	3,138,369
	Cali	924,259
	Cartagena	392,718
	Medellín	1,393,745
	Country	16,070,893

The INEGI 2020 Census identified 35.2 million housing units in México, 34% in our reference metropolitan areas. An increase of almost 15 million housing units was reported in México in the last 20 years (2000-2020) from 21.5 million to the current figure.

Table 5. Housing units in eight reference metropolitan areas of México

Existing Housing Units (2020)	Valle de México	6,134,142
	Monterrey	1,469,104
	Guadalajara	1,463,834
	Puebla-Tlaxcala	824,228
	Toluca	632,883
	Tijuana	613,090
	León	483,819
	Querétaro	417,214
	Country	35,219,141

Source: own calculations from INEGI, 2020

Henceforth, we estimate the annual flow of required new dwellings that are exclusively associated to changes in population and household composition by calculating the housing stock needs every year using (EQ.1) and then recursively subtracting the previous' year stock needs:

$$\begin{aligned}
 \text{New Housing Units Required}_{\text{year } i}(\text{Natural Demand}) = & \text{Req. Housing Stock}_{\text{year } i} - \\
 & \text{Req. Housing Stock}_{\text{year } i-1} \quad (\text{EQ.2})
 \end{aligned}$$

3.5. *Natural Depreciation and Quantitative Deficit*

In addition to accommodating new families, we would like to account for the number of dwelling units that become obsolete and must be replaced, also known as the natural depreciation or stock replacement rate. This rate can vary widely across different countries: quality in construction, vintage, materials, acts of God, and seismic regulations all contribute to generating different rates of replacement. Unfortunately to the best of our knowledge this issue seems not have been extensively and publicly published upon in either Colombia or México. More generally, we are not aware of the existence of data of natural depreciation of the housing stock in LATAM.

Emrath (2018) studied the potential housing production shortfall in the United States and found that 350,000 houses are destroyed on average per year, amounting to 0.25% of the current stock. These homes may be demolished, burnt, or simply fall spontaneously because of insalubrious conditions, fires, and other acts of God. Alternatively, some of them are left to deteriorate due to economic obsolescence. Because this is the only reliable figure we know of, we deploy it as a proxy to estimate the annual physical replacement flows required in both Colombia, and México.

A critical further measurement is that of the housing quantitative deficit. The World Bank defines quantitative deficit as the number of households that either: share a home with other

families; without access to housing; or that live in a precarious space with structural problems beyond repair (Behr, D., Et al. 2021). This number accounts for the existing informal or inadequate stock of dwellings that require full replacement. As discussed earlier, quantifying its exact magnitude is fraught with problems. Nonetheless, it is important for us to take a stand, as we want to model a baseline scenario where we completely eradicate such deficits within the next twenty years.

In Colombia, the DANE reported a 7.5% of quantitative housing deficit in 2021 (DANE, 2022). To eliminate this shortfall over the next 20 years, we assume linear depreciation of all insalubrious dwellings. This implies that the equivalent of 0.38% of the Colombian stock in 2021 ($0.075/20$) must be replaced each year through 2042.

In México, the Comisión Económica Para Latino America y el Caribe (CEPAL) calculated the percentage of replacement units from the existing stock at 6.29% (CEPAL, 2005). Therefore, in our baseline scenario, to eliminate the deficit over 20 years, we need to build the equivalent of 0.29% new units annually. While we use CEPAL's number, their figure is slightly smaller than that offered by UN-Habitat (2018). This source argues that 38.4% of households experienced housing deficits, of which 19.4% needed replacement units: 7.45% of the stock overall.

While perhaps reasonable, our estimates about natural depreciation and the replacement of infra-quality dwellings represent only a baseline scenario. Different alternative parameters can be assumed to generate more or less optimistic scenarios. Both measurements, in turn, are important drivers of our assessment of the flow of new home needs via the following equation:

$$\text{Replacement units}_i = (\text{Req. Housing Stock}_{i-1} * \text{Stock Rep. Rate}) + \left(\text{Housing Stock}_{2021} * \frac{\text{Quant Deficit Rate}_{2021}}{\text{Years to Overcome Deficit}} \right) \quad (\text{EQ.3})$$

Note that we wish to assume that new housing units are all formal and of high quality. Therefore, natural depreciation compounds at the growth rate of the stock, but the remainder of the low-quality housing inventory keeps on decreasing until its full elimination. We can now add the flows resulting from (EQ.3) to the natural demand to determine the overall required flow of new units nationwide.

$$\text{Total Annual Required New Units by Country} = \text{New Housing Units Required}_{\text{Year } i} + \text{Replacement Units}_{\text{Year } i} \quad (\text{EQ.4})$$

3.6. *Housing Size and Average Construction Costs*

Average construction costs and unit size are important economic metrics to understand housing markets. For our purposes, we wish to use these variables to establish a proxy for the total annual investment requirements in new dwellings in Colombian (COP) and Mexican pesos (MXN). This enables us to calibrate the cost of production as a share of the GDP, to measure how feasible the projected results of the model are. The procedure for determining these parameters differed substantially between México and Colombia, due to the alternative sources of information.

3.6.1. *Average Size of New Dwellings*

Initially, we wish to assume that new construction will proceed according to current dwelling typologies. Establishing an average size for housing is complicated because dwelling footage varies widely across different cities and income segments. In Colombia, some high-end products boast of footprints with above 200 square meters. Nonetheless, the lion's share of the new housing supply has recently consisted of 40 to 60 squared-meter government-subsidized dwellings *Vivienda de Interés Social (VIS)* and *Vivienda de Interés Prioritario (VIP)*. These programs were established precisely to mitigate the housing deficit. The government's housing policy has therefore skewed down the average footage of new housing production in order to make it affordable.

We use data from *La Galería Inmobiliaria*TM to calculate a weighted average of the interior area of all new units sold recently in our key Colombian cities. Their database discloses over 178,304 transactions in Bogotá, Medellín, Barranquilla, Cali, and Cartagena. Their data enabled us to classify units into 5 different types by price. The results of the weighted average area for each city and range of prices are illustrated below (Table 6).

Table 6. Average housing sqm. in Colombian Cities by Sales Price (COM)

Price Range (million M)	Average Area (sq.m)				
	Bogotá	Medellín	Barranquilla	Cali	Cartagena
0-100 M	40.52	40.12	47.91	47.54	45.49
100-160M	47.00	51.02	56.12	57.98	57.26
160-450M	48.18	60.64	66.58	68.46	69.83
450M-950M	91.97	86.08	102.96	113.01	91.07
950M-Up	162.27	178.27	245.19	230.56	166.19

Source: Own calculations from *La Galería Inmobiliaria*

Bogotá and Medellín have the smallest new dwelling sizes, which can be explained by their higher land prices. These drive developers to build at smaller footprints to keep their product affordable. Barranquilla, Cali, and Cartagena have more spacious units. The next table displays the total number of units sold in each of the major cities over the past 12 months, by price range.

Table 7. Total housing units our 5 key cities of Colombia

Price Range	Units Sold (April 21-April 22)					Total
	Bogotá	Medellín	Barranquilla	Cali	Cartagena	
0-100 M	2,376	374	7,086	8,301	1,690	19,827
100-160M	27,754	10,941	12,262	17,045	4,038	72,040
160-450M	37,856	15,737	4,484	7,275	4,925	70,277
450M-950M	5,458	4,880	1,041	1,068	1,636	14,083
950M-up	1,098	444	109	77	349	2,077
Total By City	74,542	32,376	24,982	33,766	12,638	178,304

Weighting by sales volumes yields an average national size of 58 square meters, which will be used in the model. The relatively small size of new units in Colombia has a large impact on our cost estimates below. For reference, we also calculate the weighted average unit size per city (Table 8).

Table 8. Average size of housing unit in our 5 key cities of Colombia

Weighted Av Area (m2)	Bogotá	Medellín	Barranquilla	Cali	Cartagena
	52	63	58	60	68

In México, we use the report from the “2020 Encuesta Nacional de Vivienda” (INEGI, Infonavit, SHF, 2020). As opposed to the Colombian source, we are constrained to sizing the existing stock as opposed to new construction and using country-wide data not only urban. Unfortunately, hence, our estimates here are less likely to reflect current construction conditions and priorities.

Three different size ranges were identified in the report, which allows us to approximate a winsorized weighted average unit size of 90 sqm. Like in other Latin American countries, high-end products in México can be well over 150 sqm. However, most of the housing stock over 65% is well below 100 sqm.

Table 9. Average housing units size in México

Range [sqm]	0-55	56-100	101-150	151
Percentage	28.10%	41.30%	15.60%	15.10%
Avg size [sqm]	55	78	126	151

Source: ENVI (2020)

While we adopt 90 sqm as the base-case scenario for México’s projections, the model can evaluate alternative scenarios. In all cases, we assume that unit sizes correspond to livable area 80% of overall interior area leaving 20% for mechanical equipment, common corridors, elevator, and other installations that are not included as livable space.

3.6.2. Average Construction Costs

We also endeavor to make reasonable assumptions as to the cost of building, given the variability in unit sizes, floor heights, qualitative characteristics, building systems, and finishes across the board. In Colombia, we conducted personal consultations with experts from the industry across each price range. This enabled us to estimate a weighted average national construction cost using the number of units sold by segment per Table 7 above. The following chart displays our assumptions about building costs per square meter for each price range.

Table 10. Average construction cost in Colombia circa 2020

Price Range (pesos, million)	Construction Cost (COP/m ²)
0-100 M	\$980,000
100-160M	\$1,170,000
160-450M	\$1,570,580
450M-950M	\$2,064,000
950M- Up	\$3,000,000

Evidently, costs per square meter go up with unit price, due to the higher quality finishes and additional features. Overall, the data yield a weighted average construction cost of \$ 1,482,970 COP per sqm about \$35 US per square feet. This mean is weighted by the overall square meters of each built typology, per tables 6 and 7 above. As noted earlier, this result slants toward the \$100 to \$160 million segment of VIS units that has recently exploded due to subsidies.

In México, our information comes at mid-2021 from the Cámara Mexicana de la Industria de la Construcción (CMIC, 2021). Their report itemized here in Table 11 separates between single and multifamily typologies, and between “low, mid, high, and luxury” residential products.

As expected, costs are higher for multifamily than single family, due to the additional expenses associated with going vertical. We could not obtain solid data about the shares of multi- and single-family units that were built recently. In México, a very large part of the construction of new homes is outside of the formal sector: self-construction oftentimes with the assistance of semi-professional construction workers may encompass as much as 64% of new dwellings. We thus

opted to take a simple average of the two products. Lastly, we calculated the weighted mean of construction costs of the most recent month (apr-21) for each quality category, using the weights in Table 9, obtaining an average 14,418 MXN per sqm about US \$70 per square feet.

Table 11. Average construction costs in México (Pesos/m²)

Single family Housing	Abr-20	Jul-22	Oct-22	Ene-21	Abr-21
Interés Social	6,300	6,385	6,433	6,726	7,013
Interés Medio	9,441	9,551	9,647	10,076	10,419
Semilujo	13,809	13,987	14,139	14,698	15,124
Lujo	19,269	19,556	19,812	20,502	21,089
Multifamily Housing	Abr-20	Jul-22	Oct-22	Ene-21	Abr-21
Interés Social	7,420	7,515	7,585	7,956	8,325
Interés Medio	10,190	10,318	10,432	10,893	11,304
Semilujo	17,416	17,500	17,670	18,222	18,851
Lujo	20,955	21,042	21,253	21,804	22,515

Source: CMIC (2021)

In both countries, we keep our estimates of construction costs expressed in real terms this is, inflation adjusted throughout the period because our estimates of GDP are also carried in constant 2021 real pesos. However, real costs of construction are assumed to increase with national incomes and the consequent increases in wage costs. The productivity of the building industry has not historically grown much relative to other sectors (Barbosa et al, 2017). Hence, construction costs are likely to raise faster than inflation as income grows.

Gyourko and Saiz (2006) find an elasticity of construction costs with respect to local income of 0.3 across cities in the US. This estimate excludes the sensitivity of cost inflation to national income changes. Many construction inputs are tradable and may grow in price as national wages edge up, but not necessarily faster in the cities with disproportional wage growth. This is so because industrial firms tend to locate in low-wage areas. Thus, cross sectional estimates understate the sensitivity of building costs with respect to national GDP. For this reason, and lacking global comparative research on the issue, we assign an elasticity of building costs to GDP growth of 0.5. However, uncertainty about the evolution of construction costs over such a long period is substantial. They have shot up recently 2021 to mid-2022 but are likely to go back down if the economy cools.

3.7. *Housing Construction as a Share of GDP*

International experience indicates that the construction sector seldom exceeds 10 percent of GDP. Only booming economies and rapidly developing countries with heavy public and private infrastructure and housing investments get close or even slightly above this figure. In Colombia, 6.5% of total current GDP was assigned to the construction industry (DANE, 2022). In México, according to INEGI, 6.8% of GDP belonged to construction. How much further can we push the economy in the pursuit of an affordable housing development agenda?

To answer this question, we wish to determine the cost of our desired new housing building as a percentage of GDP over the next 20 years. To obtain such an estimate, we multiply the total annual gross built area by its running average cost per square meter and divide by the country's projected annual GDP throughout the years 2022-2042.

$$\text{Housing Share as a \% of GDP} = \frac{\text{Total Interior Built Area} \times \text{Average Construction Cost}}{\text{National GDP}} \quad (\text{EQ.5})$$

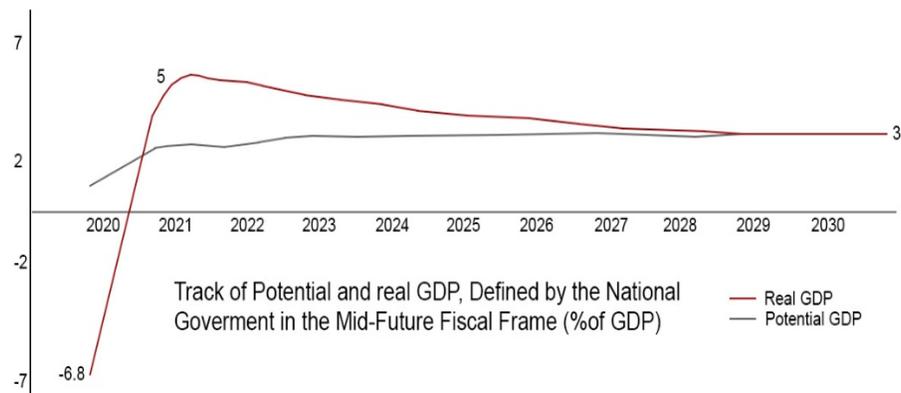
This is a rather conservative procedure, because other monetary disbursements associated with construction are excluded—for instance, investments in commercial spaces in first floors of multi-family buildings, development profits, and the fraction of public infrastructure paid by the developers. Readers can adjust this assumption in the companion EXCEL™ spreadsheet.

Projections about long run GDP growth originate from different sources. For Colombia, the following graph illustrates a GDP forecast in real COP from DANE (2022). Both actual forecast and potential income—capturing the theoretical, acyclical potential of an economy given its inputs and productivity levels—are displayed in Figure 18.

The loss of GDP during the pandemic is expected to be recouped by faster growth in the subsequent next 4 or 5 years. GDP increments are thereafter expected to converge to their potential real growth trends of 3% per annum. However, predictions about cyclical fluctuations above trend are volatile: a recent forecast by Bancolombia (2022) is similarly bullish for 2022—estimating real growth of 4.7%—but more subdued in the medium run, quickly adjusting growth to long run trends and below in 2023, 2024, 2025, and 2026 (2.9, 2.9, 2.6, and 2.5 respectively).

Uncertainty is rife about this issue. The recent war in Ukraine and the responses to inflation tensions by international central banks are bound to impact the evolution of incomes in both countries this year and beyond. Therefore, we opt for an intermediate path starting at 4.9% growth in 2022, and then progressively decreasing to the long-run potential estimate of 3% by 2026.

Figure 18. Colombia’s real and potential GDP: projections



The Banco of México offers a similar path for the covid crisis and economic recovery, with long term growth expected to hover between 1.9-3.9%, a relatively large bracket (Table 12). We choose their midpoint at 3% annual growth, identical to Colombia’s.

The future evolution of economic growth is paramount to decide the race between housing needs and income availability. Economic growth together with policies that focus on the poorest are both needed in Latin America to decidedly leave the current housing deficits behind.

Table 12. GDP growth rate Forecasts by Banco de México

2020	-8.3%
2021	4.8%
2022	1.6-2.9%
2023-2032	1.9%-3.9%

3.8. *Baseline Land Requirements*

We also wish to determine the total hectares of land needed to fulfill our new building requirements. This information is extremely valuable for city planners and government officials. While exact calculations are not straightforward – or even possible – we would like to provide some orders of magnitude of the additional buildable surface area that policymakers must enable if the countries want to meet the goal of ending quantitative deficits. To do so, we come up again with alternative methodologies – constrained by the available information in each country.

In Colombia, two different approaches are employed. We first use a rule of thumb that CAMACOL – the Colombian Chamber of Construction – has established: they propose an average ratio of 120 units per net parcel hectare of land, as illustrated below:

$$\text{Net Hectares of Land Required Yearly} = \frac{\text{Total Required Units Country Yearly}}{120 \text{ Units/Net Hectare}} \quad (\text{EQ.6})$$

Our second approach enables us to experiment with the average FAR in the country and is applied to México as well. We start by calculating the total annual area between walls by dividing average living area by a gross conversion ratio of 80%. We then multiply this result by the total number of required units. This yields the total gross interior apartment area – inclusive of walls, corridors, elevator space, and ducts. Subsequently, we divide this figure by a notional average floor-to-area ratio (FAR), which allows us to approximate the required number of *net* private parcel hectares to fulfil the projected demand – excluding streets, sidewalks, and other public spaces.

$$\begin{aligned} & \text{Net Hectares of Land Required Yearly} = \\ & = \frac{\frac{\text{Total Required Units Country Yearly} * \text{Average size of Units}}{\text{Gross conversion factor}}}{\text{FAR}} \quad (\text{EQ.7}) \end{aligned}$$

Note that both approaches focus only on private parcels – net acreage – exclusive of public land set-asides and commercial development – which would add up to form an alternative measure of gross acreage. To obtain it, one must speculate about the suitable average net-to-gross area ratio conversion factor. This is not trivial because that ratio depends on the typologies of future development.

In greenfields, it would not be unreasonable to assume that 50% of the raw land to be urbanized would be devoted to streets, sidewalks, parks, on-street parking space, and public equipments – such as schools. In this case, one may need to double private land requirements to reach an estimate of gross surface (public + private land). However – even in greenfields – there are innumerable alternate configurations of housing interior footage to surface land (UN-Habitat, 2012; Bertaud, 1988).

In brownfields and redevelopment, streets, parks, sidewalks, open parking, and other public land needs are already satisfied, so that private requirements do indeed reflect the amount of land that will be effectively redeveloped.

Note that FAR calculations already account for the share of land within private parcels that needs to be devoted to non-construction uses, such as setbacks and interior public spaces. Therefore, our net land estimates are already inclusive of such servitudes.

Note further that our intention here is to provide an approximate order of magnitude for land needs thus helping the public and policymakers understand the planning implications of alternative development scenarios. Hence, we show results from the above “net acreage” approaches in their limited assumptions, while encouraging the interested reader to experiment with alternative parameters in the companion spreadsheets e.g. 60 or 100 units per net hectare. Readers can also speculate about the types of development that we will see over the next two decades and the associated additional space demands for sidewalks, streets, parks, commercial real estate, street parking, schools, and other public facilities.

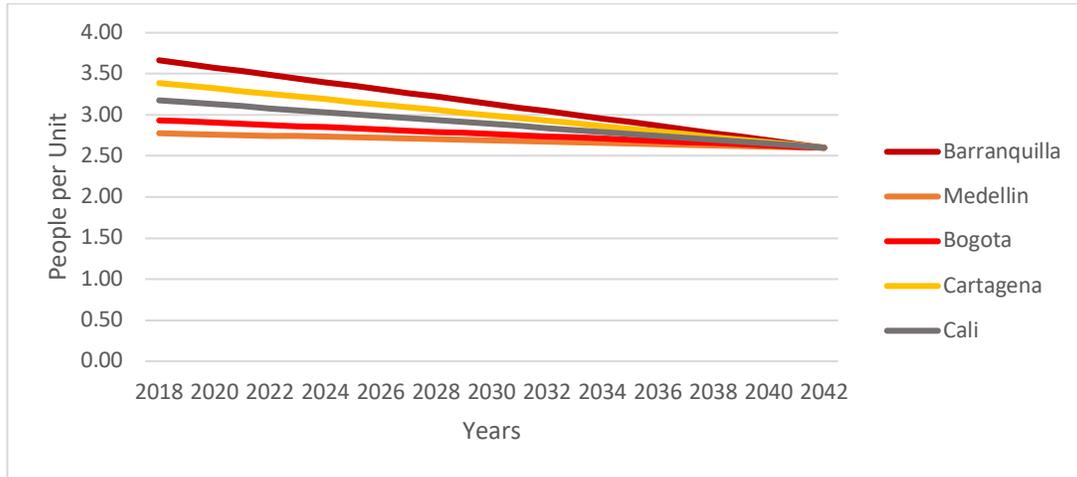
4. New Home Needs Assessment: Baseline Results

4.1. *Colombia*

We established earlier that household growth projections are determined by a combination of population growth and trends in family composition. Remember that we assume that the average number of people per household in 2042 will be at 2.6 in the country. Because the accompanying spreadsheet and some of our results are itemized at the city level, please note that there are substantial differences today in family size between more developed cities like Bogotá and Medellín (red and orange lines in Figure 19) as opposed to Barranquilla, Cali, and Cartagena. This implies that we are assuming additional demand for housing among the latter cities, as their family composition needs “modernize” thereby converging to the household formation trends of the capital.

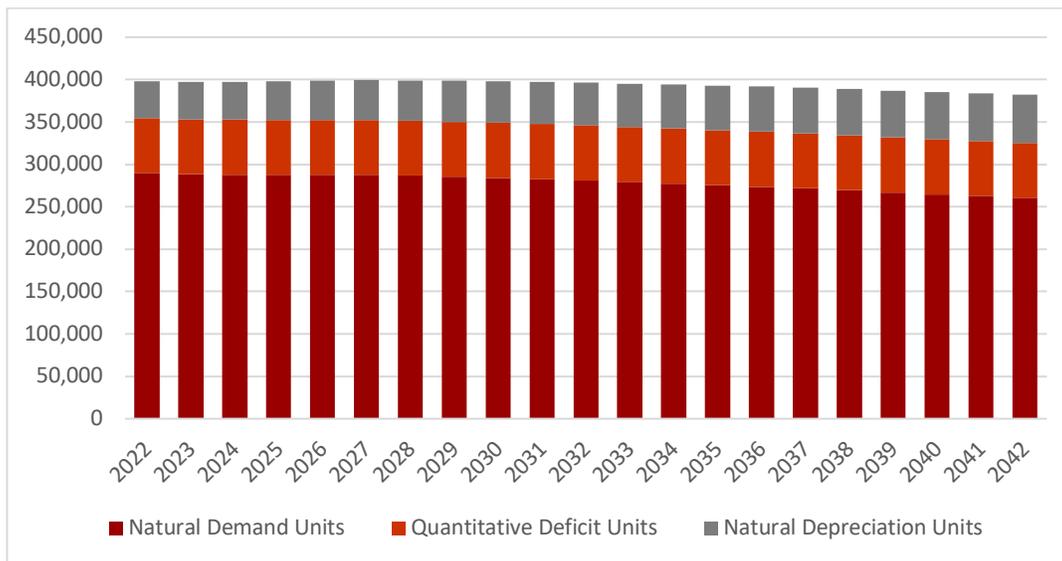
Moving to the main predictions given all our stated requirements we find that Colombia should build 393,000 housing units annually, on average, over the next 20 years (Figure 20). This is a very ambitious target, given current formal dwelling construction numbers. During 2021, over 227,000 formally produced homes were sold in the country, a record figure in the industry but still far from the dream that would lead us to the eradication of the quantitative deficit in the nation. We do not have a good estimate for the number of informally produced homes during the same period, so it is difficult to know how much of the 166,000-unit annual construction deficit is truly unmet. In addition, current formal production is slanted toward relatively small units, and issue that we will address later.

Figure 19. Household density forecast in 5 main cities of Colombia



As can also be appreciated in Figure 20, more than 278,000 units are exclusively required to fulfill the needs arising from household growth calculated using (EQ.1 and EQ.2). An additional 50,000 units yearly are required due to natural depreciation, and more than 64,000 dwellings must be built to fully combat the extant housing deficit (EQ.3).

Figure 20. New Housing Needs Assessment in Colombia



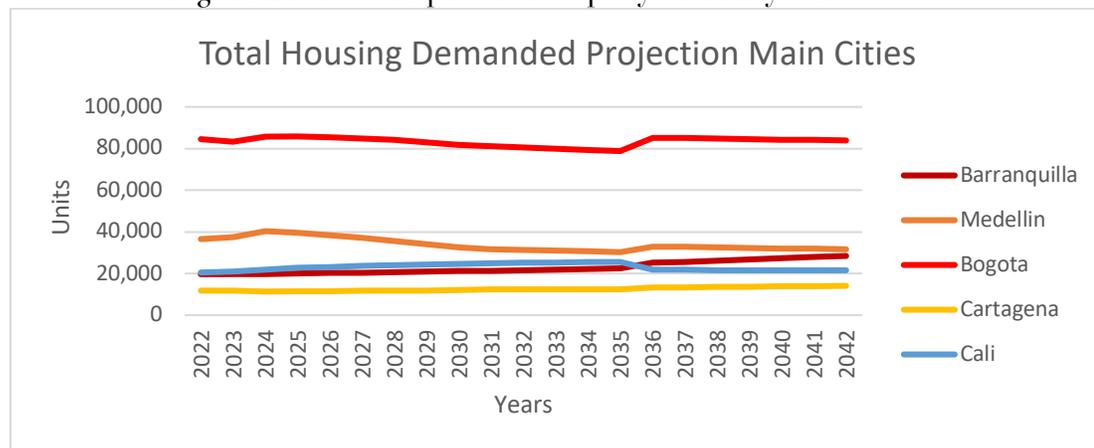
Interestingly, while the changes in family composition partially mute demographic decline for a while, this force will not be enough of a counterweight toward the end of the period, where we start appreciating a net decline in the demand for new construction. The demographic dividend for

the real estate industry in Colombia will slowly start to peter out. This may be construed as an opportunity to re-focus its forthcoming efforts on the improvement of the stock.

The results by major conurbation – as illustrated in Figure 21 below – display more pronounced growth requirements in Cali, Cartagena, and Barranquilla which still have more family downsizing to do. Barranquilla – in dark red – continues its positive trend of development over recent years and shows steady growth. So do Cartagena and Cali, albeit more moderately. Bogotá and Medellín – despite having the highest total demand for housing – project slightly decreasing rates of need over the twenty years. Again, this is explained by the fact that these cities already display lower household residential densities today. This has generated higher demand for housing in the recent past but implies less demand in the long run as the persons/home ratio stabilizes.

Of course, results at the city level would change if one assumed different quantitative replacement needs in the different cities. As Colombia keeps on developing economically and socially, the quality of the extant stock may motivate homeowners to seek full replacement for older units. By changing our quantitative deficit assumptions, these effects are straightforward for the interested reader to model in the companion spreadsheet.

Figure 21. Total required units per year in key 5 cities.



4.2. México

In México, population projections from CONAPO (2016) and the INEGI Census (2020) conform the fundamental data to determine housing needs. Moreover, we assume that all metropolitan areas are convergently decreasing to 3.0 persons per dwelling (Figure 22). This represents more of an effort in León and Puebla-Tlaxcala, which are ranked highest in household residential density in 2022:

3.81 and 3.87, respectively. Tijuana and Monterrey are the most “modern” housing markets, with ratios of 3.26 and 3.45, respectively.

Figure 22. Convergence in family composition by metropolitan areas in México

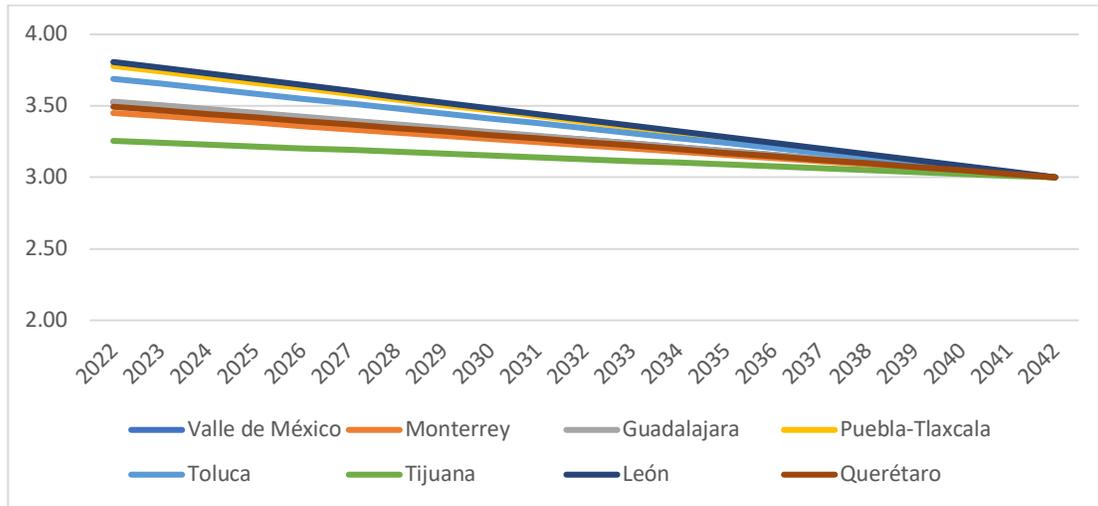
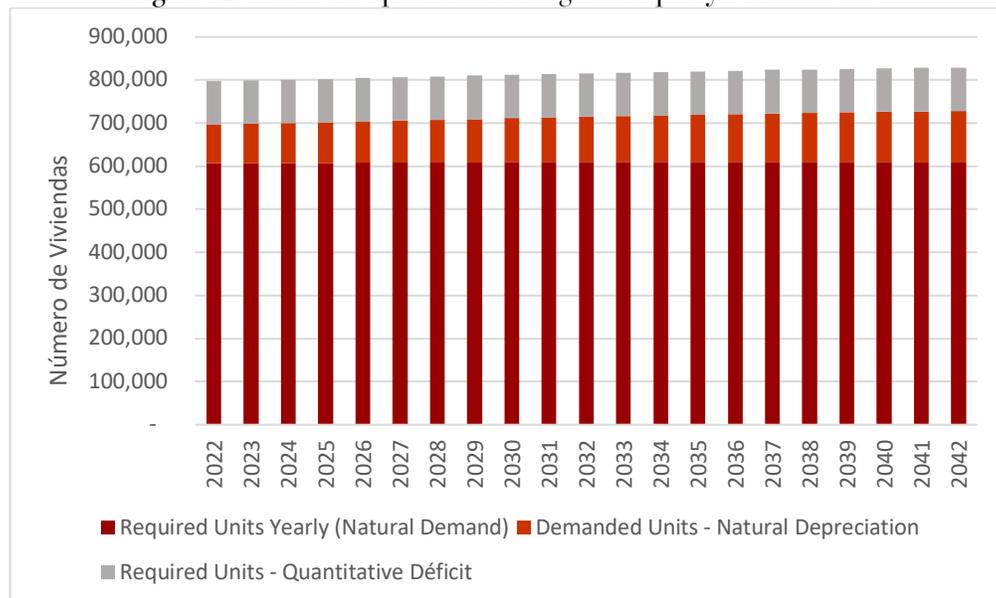


Figure 23 illustrates the output of our model. On average, México will require the development of about 814,000 housing units yearly over the next two decades. More than 600,000 units are necessary to fulfill natural household growth. Over 100,000 units replace natural depreciation, and another 100,000, must be delivered to eradicate the quantitative deficit. This latter figure may vary depending on the country’s ambitions to tackle any further upgrading of the existing stock.

Figure 23. Total required housing units per year in México

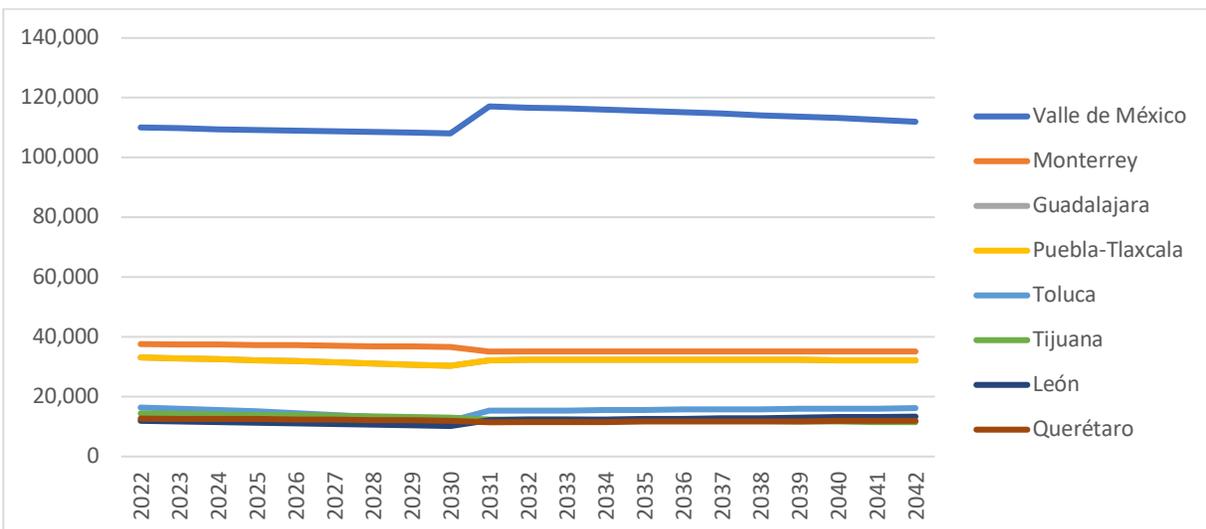


How do these results compare with the situation in the field? Because of the large size of the informal building system, it is difficult to calculate the exact number of new dwellings built in the country on an ongoing basis. The number of new units reported to the Registro Unico de Vivienda (RUS) fluctuated between 189,000 and 414,000 between 2011 and 2019, but this figure represents a severe undercount.

The 2020 census counted 35.2 million housing units. And the 2020 Encuesta Nacional de Vivienda (ENVI, 2020) noted that about 23 percent of the stock had been built within the previous 10 years. This would imply the new construction of at least 7.92 million new dwellings in the decade, or about 792,000 each year. As an alternative benchmark, note that the number of homes in the 2010 census had been at 28.6 million. Hence, 6.6 million new units had appeared “in net” by 2020, or 660,000 per year. If we generously added 200,000 replacement units built every year, that would yield a net construction of about 860,000 per year from 2010 through 2020.

Note that these numbers include a substantial number of dwellings in tourist areas, where the demand for second residences and AirBnB properties has increased. Our calculations focus on needs, and thereby exclude second residences and tourist flats. Hence as opposed to the Colombian case our numbers here seem to be only slightly larger than current building levels *net of second residences*. However, the real challenges in México are to bring all the required new construction into the formal sector; and to improve building standards. Too many self-constructed homes are structurally unsound or lack access to running water and other utilities.

Figure 24. Total required housing units per year in 8 metropolitan areas of México



Our need assessments at the city level are illustrated in Figure 24 above. Note that the discontinuity in 2031 is solely driven by our data imputation method. The stock of homes in Queretaro, León, Tijuana, and Toluca are expected to grow at a faster rate than in the Valle de México, Monterrey, and Guadalajara. But the latter cities are expected to need more construction. The conurbation of the Valley México should capture about 15% of the overall investment.

5. Baseline GDP Effort and Land requirements

5.1. Benchmark to GDP

We now use the formula in (EQ.5) to calculate the overall expenditures associated with the new buildings we hope for *at formal housing construction costs*. Note that these costs are substantially higher than those of self-construction. Therefore, the effort required in new home investment as a percentage of GDP is expected to be substantially above the current ones if we want to eliminate informality. This is especially true of México.

We calculate the participation of required formal housing construction expenditures upon the GDP to start at a 3.9% in México (2022) and then to decrease gradually to about 3.2% by 2042 (Figure 25). This shrinking percentage materializes because estimated building needs are not growing as much as real GDP.

Figure 25. Required New Housing Investment Shares of GDP: México



How much of an effort do these figures represent over the next five to ten years? According to the INEGI, the share of GDP in construction in 2019 (pre-covid) was at 7.06 percent, of which a 2.06 percentage corresponded to infrastructure and special projects and 5 percentage points to buildings. Now, assume that fifty percent of buildings are commercial: that yields an estimate of recent dwelling-construction at 2.5 percent of GDP. However, this number is based on value added (this is, it excludes the costs of input materials) and includes all work on renovations.

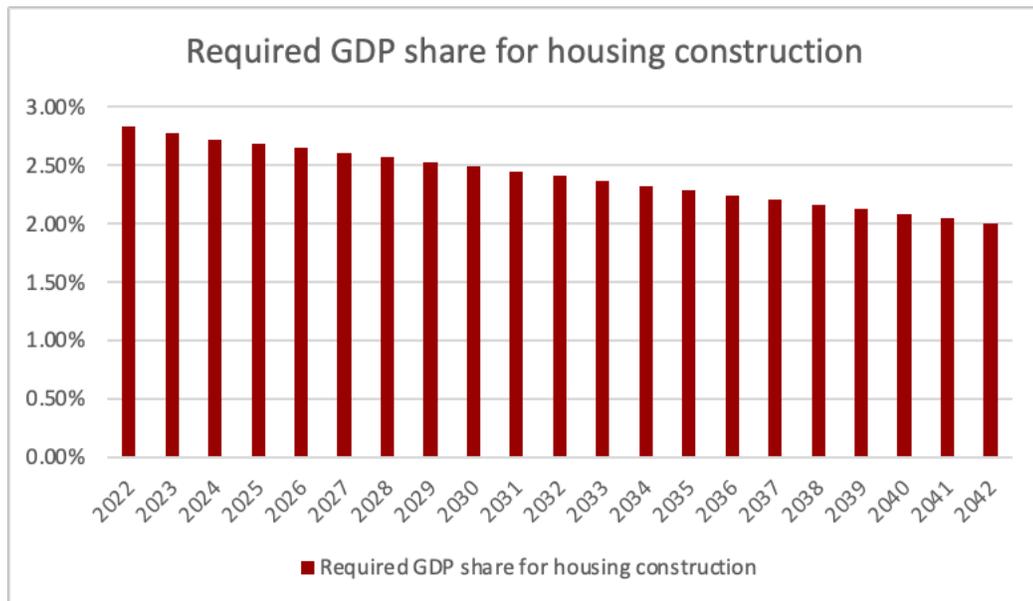
México's INEGI also provides an estimate of Gross Capital Formation (GCF) in residential real estate. In our calculations, this figure amounted to 1,321,227 million pesos in 2019 (pre-covid), compared to a GDP of 24,445,735 million. These magnitudes yield an estimate of GCF in housing of about 5.4 percent of GDP pre-covid. However, a large portion of this figure corresponds to renovations, maintenance, sales taxes, developer profits, and transaction commissions. For reference, the share of dwelling gross formation of capital effectively spent on new housing construction was 53% in the UK (ONS, 2019), and 41% in Canada (Statistics Canada, 2008). However, we could not obtain an exact equivalent figure from INEGI.

Assuming that 55 percent of housing capital formation is devoted to new housing in México, we obtain an estimated current CGF dwelling building effort of about 3% of GDP. Now, let us assume further that about 0.2 percentage points of that expenditure corresponds to second residences, which yields a current approximate effort of 2.8% of GDP on primary homes. Therefore, reaching to 3.7 percent of necessary expenditures on primary residences over GDP in the next years implies an approximately estimated increase in effort of about 0.9 percent of GDP. This a large number, as it implies 30% (0.9/3) higher expenditures on new residential construction overall. However, we believe and hope that it is an ultimately assumable magnitude. Most of the increase here comes from the higher quality (and cost) of construction associated with bringing informal production to the formal sector.

A relatively analogous pattern is evidenced in Colombia. Figure 26 shows overall desired housing construction expenditures as a percentage of GDP north of 2.8% starting in 2022 and shrinking progressively to 2% as demand growth isn't as pronounced as real GDP projections. This will leave room for more investments on qualitative improvements at the turn of the next decade.

According to CAMACOL, during recent years housing construction in the country has oscillated to approximately around 2% of GDP. In 2019, GCF represented 21% of GDP of which in turn 21.1 percent corresponded to housing. Thus, dwelling GCF amounted to 4.4 percent of GDP.

Figure 26. Required New Housing Investment Shares of GDP: Colombia



Assuming that 55% of the latter share effectively goes to new housing physical construction yields a current structural investment of 2.42%. We allow for 5% of this remainder 0.121 percentage points to be spent on secondary residences. Now, the difference between extant estimated current construction expenditures on principal residences (2.3%) and estimated needs in forthcoming years (around 2.75 percent) is close to an additional 0.5 percentage-point effort on GDP (0.45%). We thus remain optimistic, as our dream of eliminating informality in Colombia seems economically feasible. However, it does require an important increase in housing construction expenditures of 20% (or more, if we focused on the growth in the number of new units). Continuity to existing policy, macroeconomic stability, and further strengthening of the other key factors mentioned earlier in the report could bolster the market to meet this demand.

In sum according to the assumptions and results herein we believe that the long run economic growth of both countries can support our requirements, with substantial effort in the initial years. Of course, we will need the income distribution to slant toward funding dwellings for the poorest. Housing policy and the development of deeper mortgage markets will be very important in this regard. As this decade closes if economic growth keeps apace there will be even room for accelerating the improvement of housing quality and increase the average size of newly built homes.

In our view, it is important not to be excessively preoccupied with short-term gyrations in economic activity, and to focus on long term objectives and fundamentals. For instance, our projected construction needs may seem less attainable under the duress of a recession. But on the

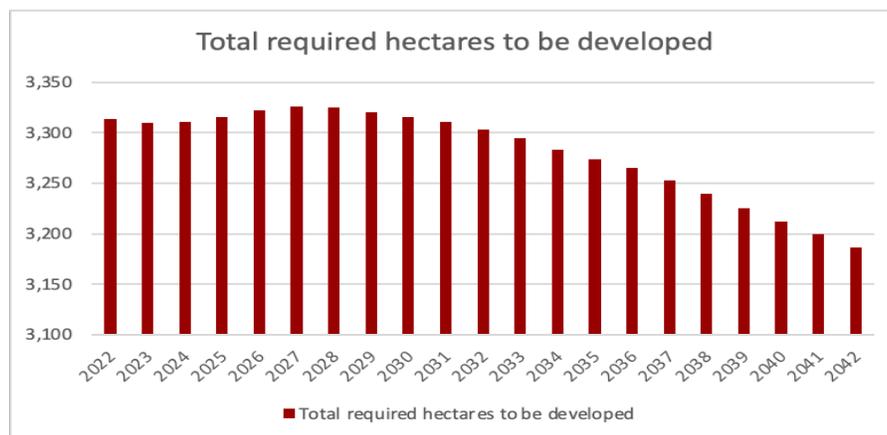
other hand, investments in much-needed shelter may provide a counter-cyclical stabilizer and jobs during such periods.

5.2. Benchmark Land Requirements

Using (EQ.6) and (EQ.7) we also calculate how much area of developable land is required for the projected new buildings. In Colombia, as described earlier, we use the average density of local master plans in middle-income neighborhoods provided by CAMACOL: 120 homes/net hectare. The required average land amounts to 3,200 net hectares per year in the next decade – as can be gauged in Figure 27.

These numbers exclude allowances for roads, sidewalks, and infrastructure. In greenfields – if the reader is comfortable assuming a 50% net to gross area ratio (e.g. Suarez-Parellon, 2017 reports such effective ratio in México city) – the requirements for raw land should be doubled.

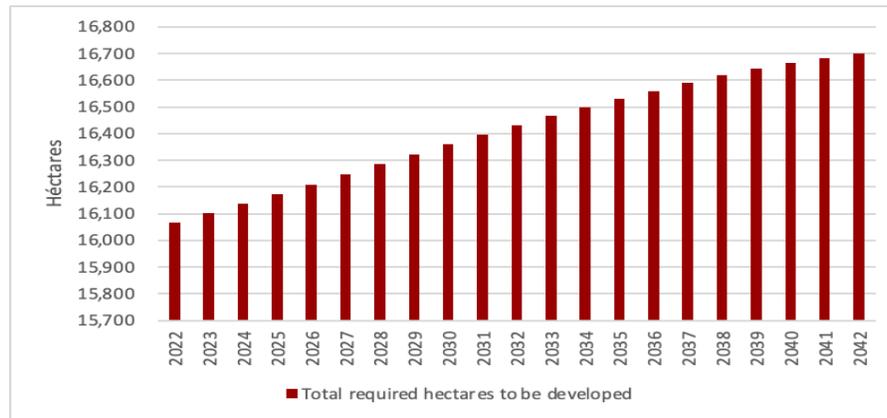
Figure 27. Total required net parcel hectares per year in Colombia



On the other hand, for México, using (EQ.7) – after estimating the required interior square meters to be developed, assuming an 80% interior loss factor, and an average 0.55 FAR – we determine that about 16,000 hectares per year will be required in the next 20 years – as displayed in Figure 28. Again, these are net figures, and one may want to double them to accommodate public infrastructure and buildings in greenfields.

The disproportionate future land needs in México arise from its larger average housing unit sizes (90 m²) and the sparse current average FAR of 0.55, which have us underwrite ground requirements of 161.2 sqm of parcel per home. Given their weight, these are two major variables upon which we will perform sensitivity analyses below.

Figure 28. Total required net parcel hectares in México



The challenge of producing this vast amount of developable land in Colombia and México in locations that have access to jobs draws back to the constraints discussed in chapter 1. Municipal governments will need to step in and become the main enablers to fulfill the dreams of eradicating the quantitative housing deficit in these two countries. The onus of housing policy must shift in the next two decades from the finance and housing ministries to the mayors and town halls throughout Latin America.

6. Alternative Needs Scenarios

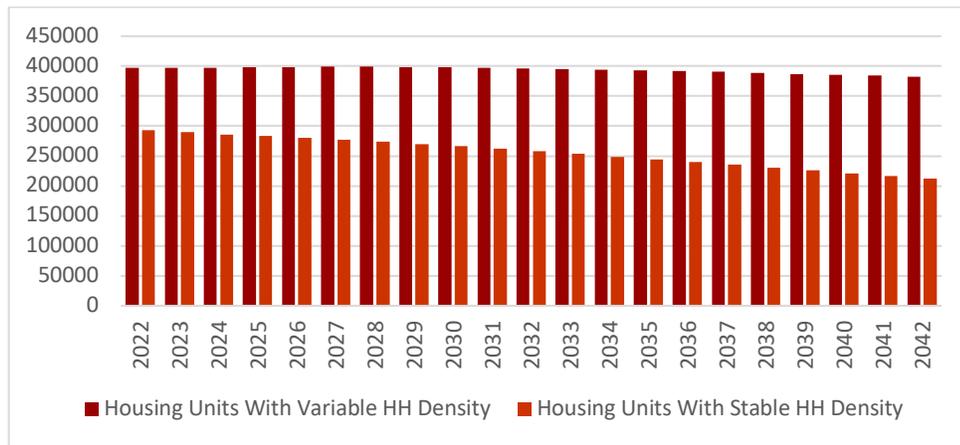
We now leverage the versatility of the model by modifying some of its main assumptions. We explore the impact of: (i) our projections about the changing nature of household formation in both countries; (ii) augmenting dwelling sizes in Colombia, which are currently smaller than what the market can probably bear in the future; and (iii) considering different FAR scenarios in our key metropolitan areas, in order to gauge how sensitive our land requirement estimates are to the nature of the real estate development to come. Readers can use the companion EXCEL™ spreadsheets to explore other alternative paths for the housing markets of these nations.

6.1 Stability in Family Dynamics and Household Residential Density

The following graphs compare two polar scenarios regarding the future of family composition. The dark red columns capture our benchmark scenario, with steady reductions in family sizes across the board; the bright red columns show what would happen if we simply assumed that residential density stayed constant. In Colombia—as we can see in Figure 29—the evolving trends of household

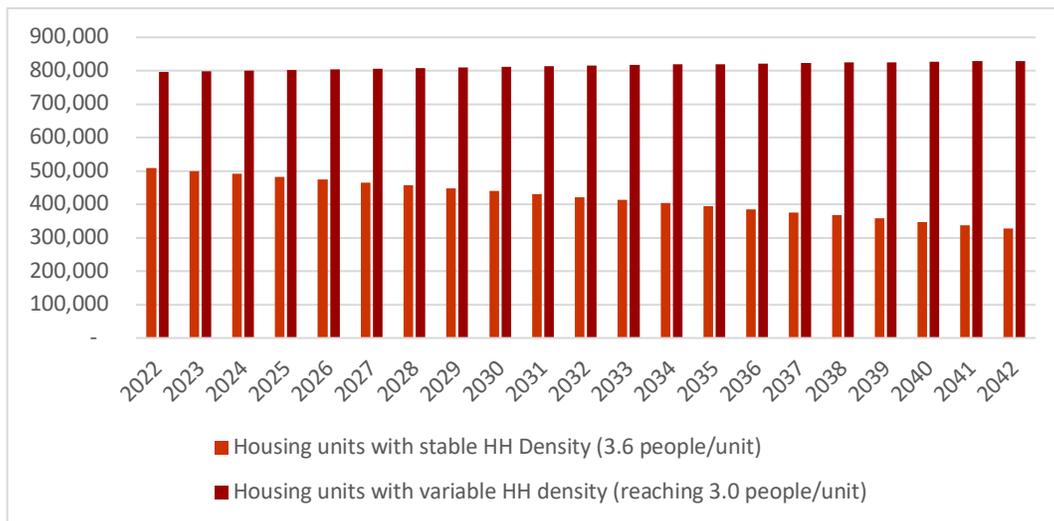
downsizing account for more than one-hundred thousand additional units early on. At the end of the two decades, natural growth will be declining and almost half of the new demand for housing around one-hundred and eighty-thousand units is expected to come from the needs associated from shrinking family sizes. In other words, most of the fuel sustaining the demand for housing in the next decades will come from changes in household structure. Developers and policymakers will need to adapt to the associated changes in new dwelling typologies.

Figure 29. Stable Household Formation: Colombia



México presents even more marked impacts attributable to family changes as depicted in Figure 30 due to the faster demographic transition modeled herein. Almost 300 thousand additional units in our annual benchmark estimate are accounted for by lifestyle changes.

Figure 30. Stable Household Formation: Mexico



If current trends continue, toward 2040 about two thirds of newly required construction in México should cater to transformations in the ways people live, with a marked growth in the number of single-headed households. Demographic growth will come to play a smaller role.

The housing needs of an unmarried forty-something, a male divorcee, a single mother, or those of an elderly person living by themselves may evolve in ways that we cannot anticipate as of yet. Real estate developers, architects, and urbanists will have to innovate and provide new templates for building and retrofitting living spaces that meet these evolving needs.

6.2 Room for Home Improvement? Larger Units in Colombia

Given what we deemed as economically feasible baseline results, we believe it is worth analyzing an increase in Colombia’s average unit size. As expositied earlier, recent construction in the nation has been driven by smaller VIS homes. This was a necessary outcome of the government’s good policies, targeting the poorest.

We now become more ambitious and assume an average unit size of 80 sqm in the future. Our assumption here is not that we will be shifting the demand toward high-income households. Rather, we want to explore a scenario where low- and middle-income housing keeps growing, but at higher qualities. Would this be possible if housing policy, mortgage markets, and land use planning were all favorable in the future?

Figure 31. Required Housing Investment Shares off GDP: 58 sqm vs. 80 sqm - Colombia

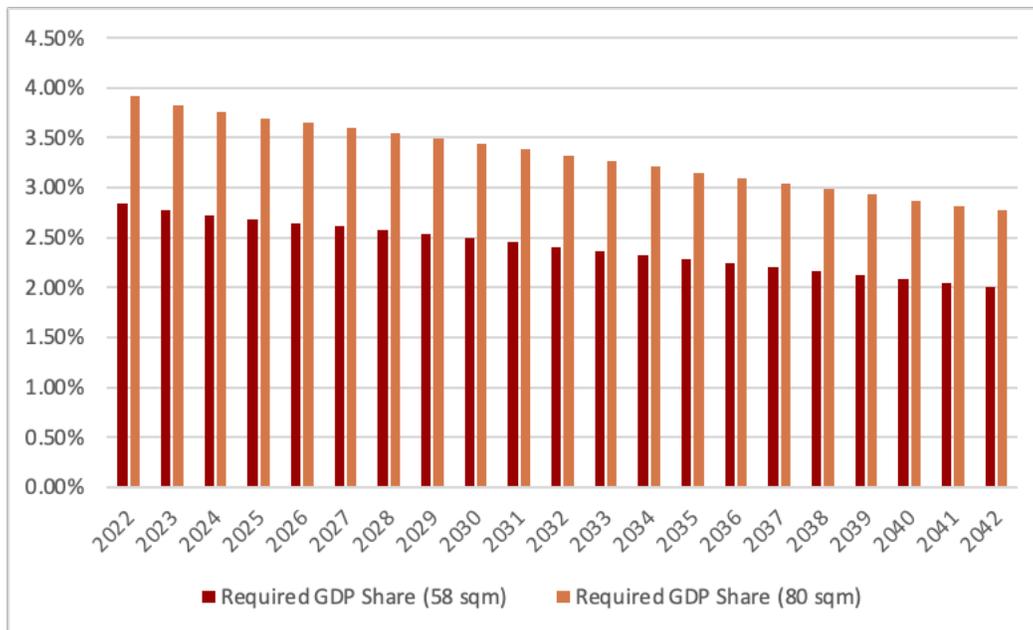
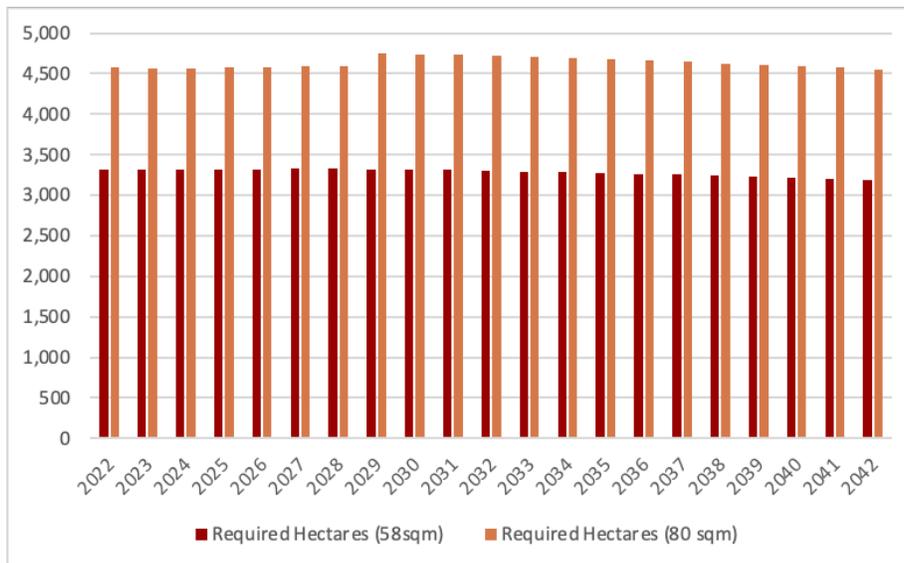


Figure 31 above compares the GDP construction shares under the baseline scenario 58 sqm and a new one larger footprint at 80 sqm per unit. The results indicate that we would now require an extra one percentage point in housing investment as a share of national income in the initial years. This comes to about 3.7% of GDP. The magnitudes now look very close to México’s, which is already building larger homes on average.

While ambitious, these figures do not seem unreachable. Moreover, note that a transition toward more spacious and high-quality dwellings could be phased out gradually, because there is a lot of economic “room” to provide more physical room at the end of the twenty-year period. The results make us optimistic about the potential for improvements in the quality of the stock in the future conditional on real economic growth to keep on moving forward apace.

But is there room in the cities to make Colombian homes roomier? Figure 32 now proportionally projects a need of one net hectare for each 87 homes so that living square meters per hectare are kept constant. As we will see later, such projections are extremely sensitive to the FAR of new future developments. Be as it may, this new scenario adds a need for an additional 1,200 hectares of building parcel per annum.

Figure 32. Required Hectares of Land: 58 sqm. vs. 80 sqm. apartments in Colombia



Remember that in greenfields, the numbers above severely understate the amount of raw land that must go under the excavator. Clearly, one of the major challenges for Colombia will be in enabling enough urban ground acreage for development. And so, it will be in México. Therefore, our next exercise explores the densification of residential development.

6.3 Required Land as a Function of Average FAR

Increasing the density of future development via higher FAR allowances allows to provide housing at minimum infrastructure costs and lesser negative environmental impacts. By substantially increasing supply in the areas with better access to jobs and amenities, large-scale dense development helps mute housing affordability problems. Hence, we now consider alternative FAR scenarios.

There are multiple ways in which larger effective average FARs can be achieved: by reducing building setbacks; by increasing buildable ground surface via the reduction of other land servitudes; by allowing cantilevered structures; or in the most straightforward way by building on more floors at higher heights.

Empirically, we now focus only on our key main metropolitan areas, where higher floor heights could make economic sense. The largest Latin American conurbations including the suburban municipalities that are adjacent to the major cities will be the ground zero for the political fight to make new housing greener and more affordable. Following equation (EQ.7), we investigate how many hectares would be necessary to develop in these big cities if we allowed for FARs from 0.5 all the way up to 6. We provide the number of cumulative hectares over the twenty-year period under the alternative urbanization assumptions.

As expected, the outcome of increasing development density is a critical reduction of the number of hectares needed during the next 20 years. While the results are straightforward, seeing them graphically in our view may help cement in the readers' minds the critical importance of urban planning in allowing for intensive real estate development.

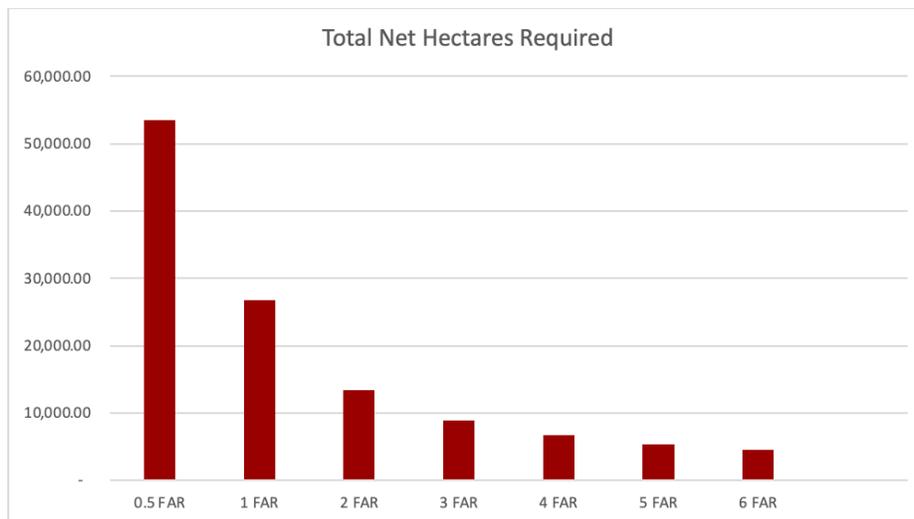
In Colombia's key cities, the results as can be appreciated in Figure 33 show a reduction that goes from a cumulative of 53,492 hectares of land at 0.5 FAR, down to 4,457 hectares at 6 FAR in the next two decades.

Note that in these exercises we fell back into our regular assumption about dwelling sizes of 58 sqm. on average. Of course, larger dwelling sizes and smaller FARs the process of suburbanization that we have typically seen in developed, and even developing countries (Angel et al. 2012) would be associated with even larger future land requirements.

It is important to remark on the nonlinearity of ground requirements with respect to changes in effective average FAR. At large FARs, development is already happening at high densities, and adding an extra floor to a building will not be releasing so much land.

On the contrary, FAR flexibility is very valuable at low densities, where piling up more square footage over the ground will release a lot of land from development happening at low densities. Practically, this implies that the political fight for high-density development should center on obtaining average effective metropolitan FARs on new development of 3 or 4 *at least* (perhaps with allowances for transferable development rights). Further increases in building density may represent harder political battles without much additional gain in terms of environmental and infrastructure costs.

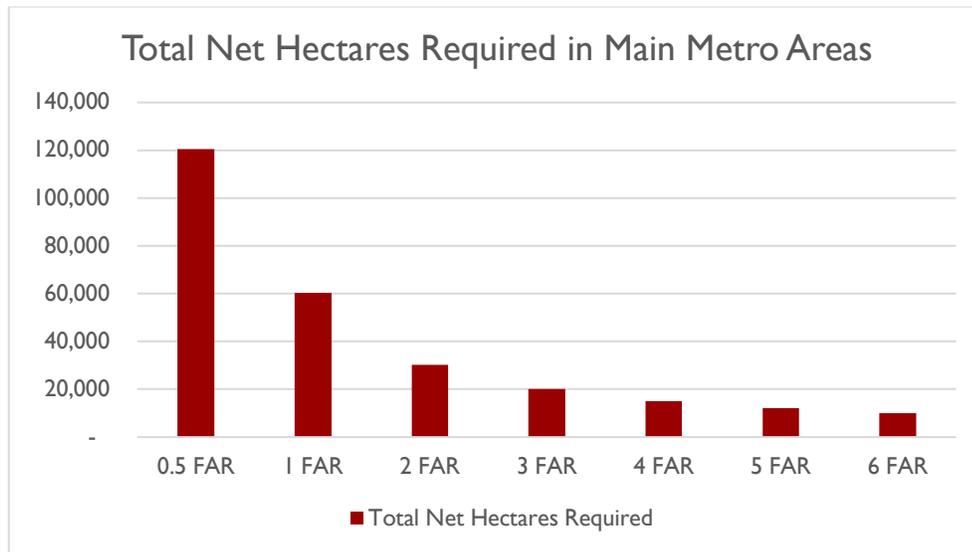
Figure 33. Cumulative Required Hectares of Metro Land (22-42) by FAR in Colombia



In our eight Mexican reference cities, Figure 34 below shows a reduction that goes from a cumulative of 120,000 hectares of land required in the next 20 years at 0.5 FAR, down to 10,000 hectares at 6 FAR.

Municipal efforts toward the re-densification of the main urban areas of Latin America especially in México (CVSR, 2014) will play a critical role to accomplish our housing market dreams sustainably and in ways in which local governments will realistically be able to provide the necessary infrastructures. For instance, UN-Habitat (2018) argues that 3.3 million new homes could be built in available but infra-utilized urban land plots in that country. Additionally, the scarcity of land in the main metropolitan areas of México has shifted construction toward unsafe land, located in flooding areas or in sites prone to landslides. According to the report “*Estado Actual de la Vivienda en México*” (SHF, CIDOC, 2014) more than 22% of housing units in the urban areas of México, are built on land with these conditions.

Figure 34. Cumulative Required Hectares of Metro Land (22-42) by FAR in Mexico



7. Conclusions

This report identifies and quantifies some of the housing challenges confronted by Latin America with Colombia and México as particular case studies. We started describing the current issues in light of the alternative definitions of housing deficiencies: qualitative and quantitatively deficits, and informality in construction and land ownership.

We then identified some of the reasons for the current problems which include: 1) developing country incomes and economic stagnation in the 1960s, 1970s, and 1980s; 2) income inequality; 3) rapid demographic growth; 4) fast-and-early urbanization woes; 5) lack of metropolitan coordination; 6) lack of supply due to municipal land use planning; 7) inefficient local permit approvals and corruption; 8) political instability and lack of long-run policy consensus; 9) insufficient access to cheap mortgage finance.

The financial markets of many LATAM nations require deepening to serve households' needs. To achieve that objective, we must: increase access to banking products among informal workers and the poor; keep macroeconomic stability; protect lenders' rights; and foster competition.

We then moved into modelling future housing requirements in México and Colombia, in ways in which we both accommodate forthcoming household growth and eradicate current quantitative deficits. We established ten critical parameters that are paramount for the future evolution of a national housing market: 1) total and urban population growth rates; 2) household formation changes; 3) the current quantitative deficit ratio; 4) the normal rate of physical depreciation and

economic obsolescence; 5) construction density – floor-to-area ratio; 6) associated land requirement ratios for infrastructure and urban improvements in greenfields; 7) the rate of greenfield versus brownfield development; 8) initial construction costs levels; 9) growth of construction costs above inflation; 10) the growth of real GDP.

Using what we believe are reasonable assumptions about these parameters, we have allowed ourselves to dream about providing formal housing to everyone in the reference countries. We benchmarked our dreams to the countries' GDP capabilities, and to land requirements.

We have estimated that Colombia needs to build about 400,000 new homes per year, whereas México needs more than 800,000. México is currently close or already fulfilling that goal, but too much construction happens informally there. Given current construction costs, we estimate that México will require almost an additional one percentage point of GDP to shift into producing homes at the current quantitative levels, but under formal conditions. In turn, Colombia needs to increase its output and would have to re-direct 0.5 percentage points from current income. These are large magnitudes that will require a substantial expansion of the formal housing construction sector which may need to be about 20 percent larger than it is now. While this re-orientation may take some time, it is not unfeasible from a macroeconomic perspective, inasmuch as future income growth trends follow those pre-covid.

Toward the end of our forecast period (by 2042), economic growth should outpace household growth in both countries and more resources will likely be devoted toward qualitative improvements and the replacement of the older stock. By then, almost half of the demand for new homes will be driven by changes in the structure of families, due to increase in the share of divorcees, the unmarried “young,” and single elderly households.

Land requirements for new housing will be enormous absent policy responses. At current national average densities (0.5 FAR), more than 120,000 net hectares of parceled land would be needed in the next 20 years in only eight of the largest cities in México, an area equivalent to 6% of El Salvador. The same calculation yields more than 50,000 hectares in the main five Colombian cities. If all development happens in greenfields, we probably need to double these land requirements to accommodate the new streets, public infrastructure, and commercial real estate. Because these magnitudes are – in our view – unfeasible, urban development will need to happen at higher densities and/or using brownfield parcels.

Municipal land use policies will intensify in their role as grounds in the fight for affordable housing throughout Latin America. While the work of international institutions and national

Housing and Finance ministries is critical for advancing the affordable housing agenda, much more attention and effort must be placed on City Halls and on the municipal political debate.

According to our sensitivity scenarios, a substantial amount of housing can be sustainably produced if new development happens at an average FAR of 2-3. While taller buildings are oftentimes a good idea, most political capital could be better spent in achieving buildings at 3-6 floors high, leaving some ground space for setbacks. Such building typologies can be designed in aesthetically pleasing ways, thereby helping gain popular support for redevelopment.

Much has changed in Latin America none the least its growing base of talented, entrepreneurial individuals with growing human capital capabilities. We remain optimistic about the future but, clearly, a lot of collective work needs to be undertaken. Part II of this report will be focused on some of the policy options that national and local governments have to reinforce current positive trends and to eliminate or mute the consequences of negative ones.

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